

SOUTH

DAKOTA



**STATEWIDE FISHERIES SURVEYS, 2004
MANAGEMENT PLAN**

South Dakota
Department of
Game, Fish and Parks
Wildlife Division
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STATEWIDE FISHERIES SURVEYS, 2004

MANAGEMENT PLAN

SOUTH DAKOTA

ANNUAL REPORT

edited by
Dan R. Jost

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John Cooper, Secretary
Department of Game, Fish and Parks

Wayne Winter
Grants Coordinator

Douglas Hansen
Wildlife Division Director

Dennis Unkenholz
Fisheries Staff Specialist

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**Statewide Fisheries Surveys, 2004
Management Plan for Permanent and Semi-Permanent Waters**

South Dakota

By

Dan R. Jost

INTRODUCTION

Efforts were directed to review, update and analyze information pertinent to the character of selected South Dakota lakes.

Management plans for fourteen public waters are contained in this report.

ACCOMPLISHMENTS

Management Region I

Management plan rewrites were scheduled for nine waters in Management Region I. Management Plans were written for six of the scheduled waters. Management Plans were not completed on three waters in Region I due to lack of data resultant from low water levels preventing surveys to be completed.

Management Region II

Management plans for eight water were written as scheduled.

Management Region III

Management plans for waters in Region III were scheduled but not completed due to lack of time and a change in format to report management plans with the Fish Population Survey reports. Management Plans for waters scheduled under this segment will be completed at the time of the scheduled lake surveys.

Management Region IV

Management plans in Region IV were not scheduled or completed due to a change in reporting format. Management recommendations and options are reported in the annual lake survey reports for these waters.

Reservoir Management

Management plans for Lake Oahe, Lake Sharp, Lake Francis Case, and Lake Lewis and Clark are written periodically as dictated by changes in management direction. Management plans for these waters are reported utilizing a separate format.

OBJECTIVES

To complete or update management plans and outline goals, objectives and strategies on South Dakota waters.

PROCEDURES

Reports and data from all available sources were analyzed to prepare a history of the past and present management of each body of water and current management plans were formulated. Various management actions are scheduled considering the development or changes in limnological and ecological structure of the lake. These actions may include manipulation of fish populations by stocking, harvest, or rehabilitation using population control practices and/or changes within the watershed, fishing regulations, access development, and lake basin modifications. The management plans include previously prepared information, data from periodic surveys, and changes in the ecological, limnological and population dynamics of the water.

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FIVE YEAR FISHERIES MANAGEMENT PLAN

Water: Angostura Reservoir

County: Fall River

Present Plan: F-21-R-37

Date: Jan 1, 2005 to Dec 31, 2009

Previous Plan: F-21-R-30

Date: Jan 1, 1998 to Dec 31, 2002

Surface Area: 4,612 acres

Management Class: WWP

Maximum Depth: 70 feet

Mean Depth: 29 feet

Legal Description: T 8S, R 5,6E, Sec. 1-12, 17, 19-21, 28-33

MANAGEMENT GOAL

To optimize angling opportunities at Angostura Reservoir.

OBJECTIVES AND STRATEGIES

Objective 1. Maintain walleye numbers at a moderate density and maintain a balanced population with good individual growth.

Strategy 1. To maintain a walleye fishery with a minimum gill-net CPUE for stock-length walleye of 20, a PSD range of 30-60, increase RSD-P to 10 or greater, and maintain a mean growth rate of no less than 35.5 cm (14 in) at age-3.

Action 1a. Evaluate the walleye population by conducting lake netting surveys annually. If the 14-inch minimum and 1 over 20 daily limit appears unable to meet criteria in Objective 1 then explore other possible regulations (i.e. protected length group with one large fish, etc).

Action 1b. Stock walleye fingerlings at a rate of 400,000 small fingerlings (or numbers as available) when supplementing the population is deemed necessary.

Objective 2. Maintain the gizzard shad population.

Action 2a. Evaluate gizzard shad over-winter survival through trap net and gill net catch during annual lake surveys and shad reproduction through daytime electrofishing in late summer.

Action 2b. Stock 100 to 200 prespawm adult gizzard shad the following spring if no adult or few age-0 shad are found during sampling.

Objective 3. Maintain an angler satisfaction rate of 64.5% or greater. Gigliotti (2004) reported a statewide angler satisfaction rate for SD resident and non-resident anglers of 64.5%.

Strategy 3a. Conduct a roving creel survey every 5 to 10 years to determine angler satisfaction and attitudes, and catch and harvest rates.

Objective 4. Keep the Fall River County Conservation Officer, the Bureau of Reclamation, and the public informed of fisheries management activities and solicit their input when planning future changes to the fishery.

Strategy 4a. Provide lake survey reports, creel reports, and management plans when requested.

5 YEAR OPERATIONAL PLAN

1. Conduct standard fisheries population surveys annually utilizing twelve 24-hour frame net sets and a minimum of eight 150-foot experimental gill net sets.
 2. Analyze fishery survey data, creel surveys and other fisheries work at the reservoir and publish the data in report form in Statewide Fisheries Surveys Annual Reports.
 3. If netting reveals walleye CPUE less than the stated objective values then stock 400,000 small fingerlings (or numbers as available) to supplement the population.
 4. If data indicates few or no adult gizzard shad then stock 100 to 200 adult prespawn shad the following spring.
 5. While the shad population is doing well, use excess adult shad to stock Belle Fourche and Shadehill Reservoirs.
 6. If angler satisfaction rates drop substantially below 64.5%, re-evaluate angler attitudes towards the fishery and develop a management option that addresses angler wants.
 7. Conduct a thorough evaluation of the current management plan and complete a new plan by January 1, 2010.
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INVENTORY

Angostura Reservoir, also known as Angostura, is a large irrigation reservoir in southwestern South Dakota. The reservoir was created after the U.S. Bureau of Reclamation completed construction of Angostura Dam on the Cheyenne River in 1949. The dam and reservoir were authorized under the Water Conservation and Utilization Act of 1939, approved in 1941 and included in the Missouri River Basin Project, now known as the Pick-Sloan Act. Originally the dam was built for flood control, hydroelectric power and as an irrigation source for approximately 12,218 acres of farm/rangeland. The 1,200 kilowatt power plant was abandoned in 1960 and the primary purpose today is irrigation.

The first irrigation waters were delivered in 1953 and full water delivery service was accomplished in 1956. Responsibility of irrigation was originally with the Bureau of Reclamation. In 1968, however, the Angostura Irrigation District assumed responsibility for operation and maintenance, which continues today.

Angostura has a surface area of approximately 4,612 acres when full and volume capacity of 138,761 acre feet. The average depth is 29 feet and the deepest portion of the lake is 75 feet deep when full. The lake's average summer temperature is 66 degrees F. The reservoir has 36 miles of shoreline of which a large portion is fine sand. The reservoir covers approximately 17 miles of the Cheyenne River with an additional 7.6 miles extending along Horse Creek. Average width of the lake is approximately 1/2 mile in the main stem and 1/3 mile in the Horsehead Creek arm.

The Angostura Reservoir watershed consists of approximately 9,034 square miles of livestock pastureland. Ownership of the watershed is predominately private with a small portion in Buffalo Gap National Grassland.

Shoreline vegetation is limited around most of the reservoir due to water level fluctuations and wave action. During spring months as the reservoir is refilling, vegetation along the periphery of the reservoir is flooded and fisheries reproduction can be high. Curlyleaf pondweed has become established in protected bay areas.

Ownership of Lake and Adjacent Lakeshore Properties/Fishing Access:

Angostura Reservoir and Dam is owned by the Bureau of Reclamation. The Bureau of Reclamation (BOR) owns approximately 4,650 acres of land around the reservoir. Management of these public lands is the responsibility of the South Dakota Department of Game, Fish and Parks under an agreement with the BOR. Approximately 1,200 acres on the eastern shore have been classified as a State Recreation Area and 1,700 acres of land on the west and south shores is managed for recreation and wildlife.

The State Recreation Area contains four campgrounds, four boat ramps, eight cabins overlooking the reservoir and day-use areas. Also within the recreation area the Game Fish and Parks has an agreement with Angostura Resort Management which provides concessionaire services to the park through a marina with three locations and 155 boat slips, a beach club, six rental lodges with outdoor pool and a full service floating convenience store in the marina.

Fishery Management:

Management of the Angostura Reservoir fishery has been primarily as a walleye fishery. Beginning in January 2003, a daily limit of only one walleye over 20-inches was added to the 14-inch minimum-length-limit. It is hoped the restriction on larger walleye will distribute these fish among

anglers, as well as, impress the value of larger walleye to the anglers and promote higher release rates.

Black crappies were numerous in the early to mid 1990's but density has declined to extremely low levels during 2003 and 2004. The drop in numbers was most likely due to a combination of factors: low water levels from drought conditions (i.e. reduced habitat), high angler harvest (Galinat 2004), and the increase in predator (particularly walleye and smallmouth) densities. The daily limit of 25 was reduced to 15 at the request of local anglers in hopes to help the population rebound when normal water levels are maintained.

In an attempt to establish a declining forage base for increasing sportfish populations, gizzard shad were stocked in the reservoir from 1990 to 1994. Annual seining began in 1994 to index reproduction of the gizzard shad population and continues today. Over-winter survival of adult shad has been successful and, until 2001, Angostura shad were the adult stocking source for the Belle Fourche, Shadehill and Bowman Hailey reservoirs.

Stockings have recently been limited to walleye fingerlings. Past stockings have included largemouth bass fingerlings and rainbow trout fingerlings. The trout fingerlings were excess fish from Cleghorn Hatchery to be disposed of and therefore, added as supplemental forage for the Angostura fishery.

Fish Population Characteristics:

Netting was conducted at Angostura Reservoir from 9 to 11 August, 2004. The netting survey consisted of four 300' gill net nights and 8 trap net nights. A combined total of sixteen species were collected in both gear types during the survey (Tables 3 and 4). Fourteen species, totaling 846 fish, were collected in four experimental gill nets and 10 species, totaling 91 fish, were collected in the trap nets. Discussion of the more common fish species are in the following tables and text.

Table 1. Stocking record for Angostura Reservoir, 1993-2003.

Year	Number	Species	Size
1993	150,000	Largemouth bass	Fingerling
	235,000	Walleye	Fingerling
1994	43	Gizzard shad	Adult
	67,870	Largemouth bass	Fingerling
1995	100,000	Largemouth bass	Fingerling
	204,555	Walleye	Fingerling
1996	135,387	Largemouth bass	Fingerling
	354,070	Walleye	Fingerling
1998	109,962	Largemouth bass	Fingerling
	201,084	Walleye	Fingerling
1999	15	Gizzard shad	Adult
	48,000	Largemouth bass	Fingerling
	248,280	Walleye	Fingerling
2000	97,133	Rainbow trout	Fingerling
	207,779	Walleye	Fingerling
2001	12,638	Largemouth bass	Fingerling
	37,000	Rainbow trout	Fingerling
2002	50,100	Walleye	Fingerling
	30,000	Smallmouth bass	Fingerling
2003	218,791	Walleye	Fingerling
	80,000	Rainbow trout	Fingerling

Table 2. Catch data (CPUE's with 80%CI's in parentheses; PSD, RSD-P with 90%CI's; mean Wr-S with 80%CI's) for all fish species collected from eight ¾-inch trap nets in Angostura Reservoir, August 9-11, 2004.

SPECIES	N	CPUE	CPUE-S	PSD	RSD-P	Wr • S
Black crappie	15	1.9 (1.6)	0.6 (0.5)	40 (52)	20 (43)	95.2 (10.8)
Bluegill	6	0.8 (0.6)	0.8 (0.6)	67 (43)	0 (--)	99.8 (6.7)
Channel catfish	38	4.8 (1.9)	1.3 (0.4)	10 (18)	0 (--)	76.5 (3.1)
Freshwater drum	3	0.4 (0.3)	0.1 (0.2)	--	--	85.1 (--)
River carpsucker	11	1.4 (0.9)	1.4 (0.9)	91 (17)	82 (22)	88.8 (6.9)
Rock bass	4	0.5 (0.4)	0.5 (0.4)	--	--	83.8 (15.9)
Shorthead redhorse	5	0.6 (0.6)	0.6 (0.6)	--	--	81.3 (4.1)
Smallmouth bass	2	0.3 (0.2)	0.3 (0.2)	--	--	89.1 (8.6)
Walleye	6	0.8 (0.6)	0.6 (0.5)	--	--	74.7 (5.4)
White Sucker	1	0.1 (0.2)	0.1 (0.2)	--	--	83.2 (--)
Totals	91					

Table 3. Catch data (CPUE's with 80%CI's in parentheses; PSD, RSD-P with 90%CI's; mean Wr-S with 80%CI's) for all fish species collected from two, 300-ft experimental sinking gill nets in Angostura Reservoir, August 9-11, 2004.

SPECIES	N	CPUE	CPUE-S	PSD	RSD-P	Wr • S
Black crappie	15	3.8 (4.7)	0.5 (0.5)	0 (--)	0 (--)	99.6 (-)
Channel catfish	462	115.5 (51.7)	38.0 (17.2)	14 (5)	0 (--)	80.1 (1.1)
Common carp	84	21.0 (23.6)	21.0 (23.6)	29 (9)	1 (2)	84.0 (1.6)
Freshwater drum	64	16.0 (9.3)	8.8 (6.7)	20 (12)	3 (5)	86.4 (1.0)
Gizzard shad	6	1.5 (1.1)	0.8 (0.8)	--	--	96.1 (15.4)
Largemouth bass	1	0.3 (0.4)	0.3 (0.4)	--	--	101.9 (-)
Northern pike	1	0.3 (0.4)	0.3 (0.4)	--	--	97.0 (-)
River carpsucker	51	12.8 (5.5)	12.8 (5.5)	100 (--)	92 (6)	97.5 (1.9)
Shorthead redhorse	9	2.3 (3.2)	2.3 (3.2)	100 (--)	11 (21)	76.0 (1.2)
Smallmouth bass	3	0.8 (1.2)	0.8 (1.2)	--	--	91.7 (8.2)
Spottail shiner	1	0.3 (0.4)	0.3 (0.4)	--	--	--
Walleye	137	34.3 (14.1)	30.3 (13.0)	57 (8)	6 (4)	82.2 (0.4)
White sucker	1	0.3 (0.4)	0.3 (0.4)	--	--	99.0 (-)
Yellow perch	11	2.8 (3.5)	2.5 (3.1)	50 (31)	10 (18)	84.4 (4.9)
Totals	846					

Black crappies

While abundance of black crappies has remained low since 2001 stock density indices and mean conditions have been good (Table 4). The low numbers of black crappie may be resulting from a combination of factors including a good density of predators (i.e. walleye and smallmouth bass), high angler harvest rates (Galinat 2004), good shad survival and low water levels leaving little cover for much of the year.

In response to concerns raised by local anglers and the low catch rates, the daily limit was reduced from 25 to 15. Reduction in daily limit will likely not have a large affect on the population but it is hoped reducing harvest might aid the population in recovering to higher densities if/when other suppressing factors abate.

Table 4. Composite listing of catch data from trap nets for black crappie from Angostura Reservoir, 2000-2004.

Year	N	CPUE	CPUE-S	PSD	RSD-P
2000	146	15.8 (7.0)		85 (5)	30 (6)
2001	22	1.8 (1.7)	1.6 (1.6)	79 (17)	63 (20)
2002	33	3.0 (1.3)	1.9 (1.0)	52 (20)	29 (18)
2003	30	2.7 (0.9)	2.0 (0.7)	55 (19)	14 (13)
2004	15	1.9 (1.6)	0.6 (0.5)	40 (52)	20 (43)

Channel Catfish

Channel catfish were the most abundant species collected in gill nets and trap nets with CPUE's for stock length and larger fish of 38.0 and 1.3, respectively (Tables 2 and 3). Stock density indices were similar to years past with a low PSD and very low to no value for RSD-P (Table 5).

The lack of larger catfish is most likely due to the high abundance of smaller catfish. Shad reproduction seems to be providing ample forage for the reservoirs fisheries but channel cat size structure remains poor and creel surveys show very few anglers targeting or harvesting catfish. During Spring 2003 and 2004 trap netting was accomplished at the reservoir to supplement other channel cat fisheries around the state. It is hoped the removal of adults might improve size structure but the number to accomplish this is probably higher than what has occurred so far.

Table 5. Composite listing of annual gill net sample data for channel catfish from Angostura Reservoir, 2000-2004.

Year	N	CPUE	CPUE-S	PSD	RSD-P
2000	483	96.6 (33.1)	50.8 (17.1)	20 (4)	3 (2)
2001	339	67.8 (49.2)	31.4 (26.3)	20 (6)	2 (2)
2002	351	87.8 (29.8)	15.5 (17.8)	3 (4)	0 (--)
2003	233	58.3 (26.4)	16.5 (6.0)	8 (6)	0 (--)
2004	462	115.5 (51.7)	38.0 (17.2)	14 (5)	0 (--)

Smallmouth bass

During walleye tagging in April 2004, smallmouth bass were also measured, weighed and scale samples taken from a subsample. Spring netting gave a large sample of 177 fish (Table 6). Most fish sampled were between 11 and 15 inches with some up to 18 inches in length (Figure 1). The gear and timing may have been biased toward larger fish, none the less, it gave us good age, growth and condition data. Fish condition was excellent with a Wr for stock-length and larger fish of 102.9 and growth was very fast with four year old bass averaging 2 inches longer than the statewide average.

Table 6. Angostura smallmouth bass sampled while tagging walleye using framenets in April.

Year	N	PSD	RSD-P	RSD-M
2004	177	94 (3)	37 (6)	4 (2)

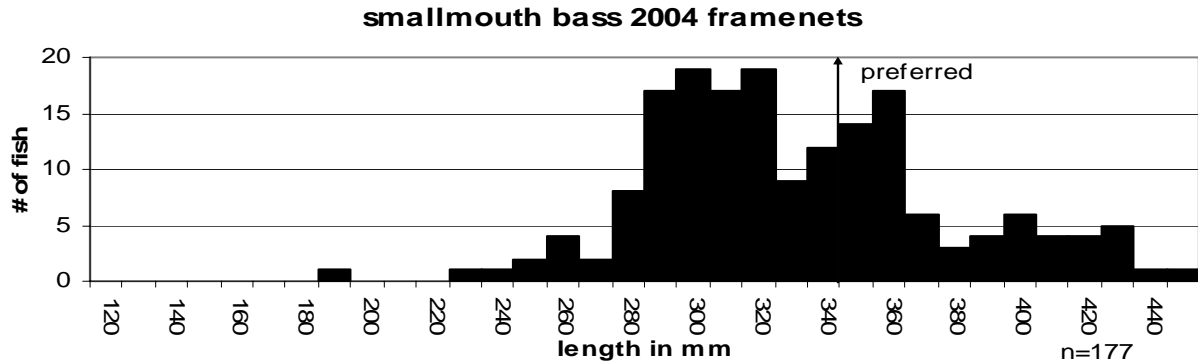


Figure 1. Length frequencies of smallmouth bass from frame nets at Angostura Reservoir, Spring 2004.

Walleye

Walleye abundance and stock density indices have remained fairly stable at Angostura (Table 7). Gill net catch of stock length and greater fish has ranged between 15 and 30 fish over the last few years and size structure of the fishery appears to be similar. Mean condition also has remained nearly the same for all sizes of fish for the last 4 years (Figure 2).

A tagging study and creel survey were both done on Angostura walleye in 2004. The total estimate of walleye was 35,251 ($\pm 9,607$; 80%CI) fish over 10 inches. Harvest appeared to be extremely high with an estimated 21,720 ($\pm 3,600$; 80%CI) walleye taken by anglers from April through December. The tagging and creel data combined suggests up to 61% of the adult walleye population could have been harvested. Although it has been determined a 35% is the maximum exploitation rate a walleye population can sustain (Hansen et al. 1991), angling reports and annual survey data indicate the Angostura walleye population is remaining stable. Future creels will help determine if the high catch and harvest of 2004 is normal for the population or if high harvest occurs every few years.

Table 6. Composite listing of annual gill net data for walleye collected by gill net from Angostura Reservoir, 2000-2004.

Year	N	CPUE	CPUE-S	PSD	RSD-P
2000	249	49.8 (15.5)		43 (6)	7 (3)
2001	87	17.4 (11.7)	15.4 (10.9)	31 (9)	8 (5)
2002	135	33.8 (19.2)	28.3 (19.3)	50 (8)	4 (3)
2003	117	29.3 (26.2)	23.3 (19.7)	32 (8)	2 (3)
2004	137	34.3 (14.1)	30.3 (13.0)	57 (8)	6 (4)

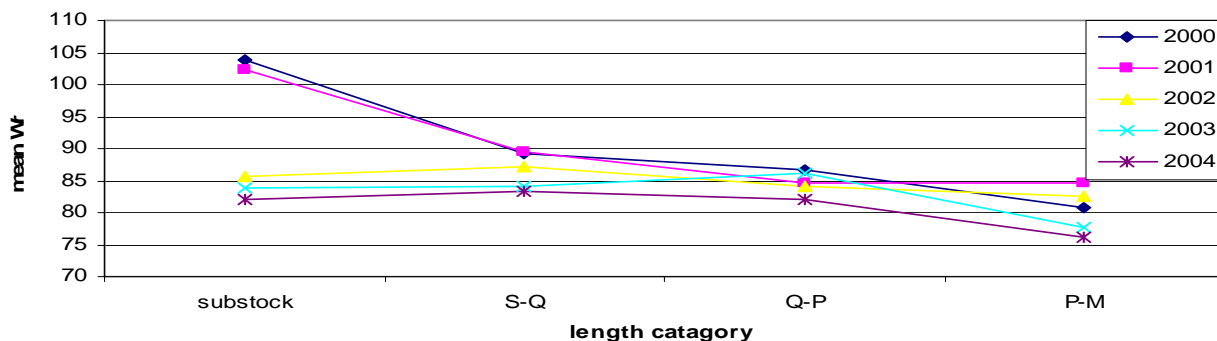


Figure 2. Walleye mean Wr for different length categories of walleye from 2000-2004 lake surveys.

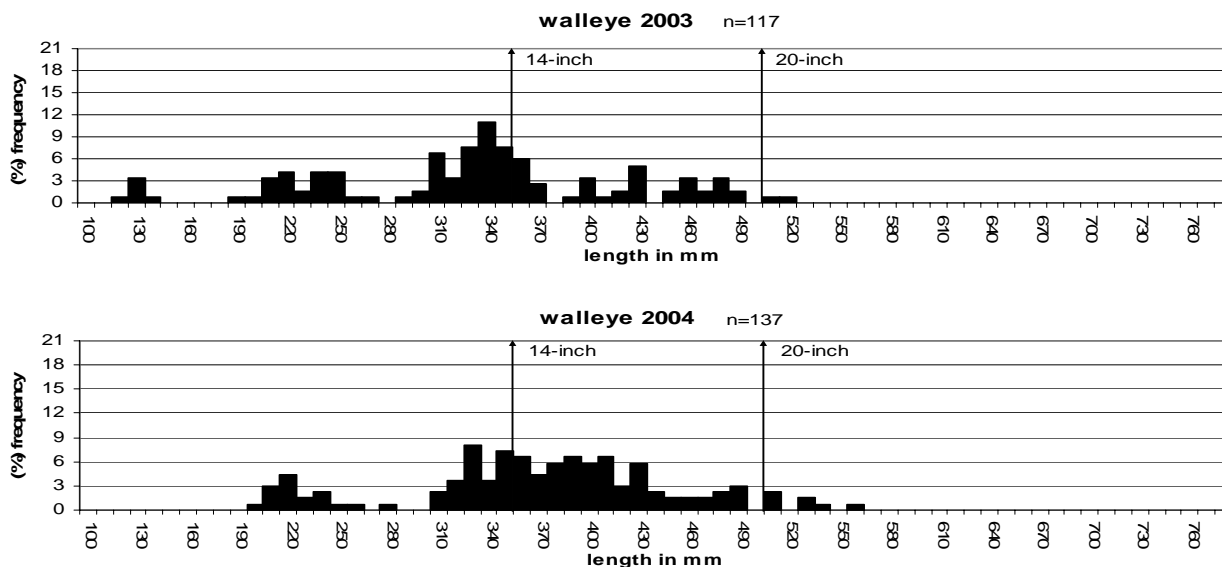


Figure 3. Length frequency histogram for walleye from gill nets, Angostura Reservoir, 2003-2004.

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- Gigliotti, L.M. 2004. Fishing in South Dakota - 2003. Fishing Activity, Harvest and Angler Opinion Survey, Volume 1. Special Report, HD-6(1)-04.AMS. South Dakota Department of Game, Fish and Parks. Pierre, South Dakota.
- Hansen, M.J., M.D. Staggs, and M.H. Hoff. 1991. Derivation of Safety Factors for Setting Harvest Quotas on Adult Walleyes from Past Estimates of Abundance. Transactions of the American Fisheries Society 120:620-628.

FIVE YEAR FISHERIES MANAGEMENT PLAN

Water: Dalton Lake

County: Lawrence

Present Plan: F-21-R-37

Date: Jan 1, 2005 to Dec 31, 2009

Previous Plan: F-21-R-32

Date: Jan 1, 2000 to Dec 31, 2004

Surface Area: 2.3 acres

Management Class: CSP

Maximum Depth: 9 feet

Mean Depth: 6 feet

Legal Description: Township 3N, Range 5E, Sections 11

MANAGEMENT GOAL

To optimize angling opportunities at Dalton Lake.

OBJECTIVES AND STRATEGIES

Objective 1. Maintain Dalton Lake's put and take rainbow trout fishery.

Strategy 1. Stock catchable rainbow trout periodically through the open water season to provide catch rates of no less than 0.50 trout per hour, similar to stated rates for the Black Hills streams (Erickson et al. 1993).

Action 1a. Continue stocking 11 inch trout monthly from April through June and in September at a rate near 180/surface acre/year.

Current Annual stocking schedule:

April	150 rainbow trout
May	100 rainbow trout
June	75 rainbow trout
September	100 rainbow trout

Objective 2. Keep the local Conservation Officer, US Forest Service and the public informed of fisheries management activities and solicit their input when planning future changes to the fishery.

Action 2a. Provide lake survey reports, creel reports, management plans and present data when requested/needed.

5 YEAR OPERATIONAL PLAN

1. Continue stocking catchable rainbow trout at an annual rate near 180 fish per surface acre per year.
 2. Conduct standard fisheries population surveys every 5 years (prior to updating the Dalton Lake Management Plan) utilizing four 24-hour frame net sets, a minimum of one 150-foot experimental gill net sets.
 3. Analyze fishery survey data and publish the data in report form in Statewide Fisheries Surveys Annual Reports.
 4. Conduct a thorough evaluation of the current management plan and complete a new plan by January 1, 2010.
-

INVENTORY

Dalton Lake is a small impoundment on US Forest Service land located in the northeastern edge of the Black Hills. The dam was constructed in 1935 by the Civilian Conservation Corps and had a maximum depth of 19 feet and surface area of 2.7 acres at initial construction. The lake proved to load quickly with sediment and a sediment removal effort was accomplished by the Forest Service in 1960.

The flood on June 9, 1972, however, deposited large amounts of silt and debris in the lake again and damaged the retaining structure. Dalton Lake was one of seven dams severely damaged by the storm and rebuilt by the Forest Service. Two additional dams on Deer Creek were completely destroyed and not rebuilt due to little recreational value to the public. Before reconstruction began the Game Fish and Parks joined in a cooperative effort to restore the fishery in which the Forest Service rebuilt the dam structure and the Game, Fish and Parks contracted a sediment removal project. Reconstruction of the dam structure was completed in July 1974 and the sediment removal project, in which 14,000 yards of sediment was removed, was completed by August 1974.

The watershed is largely public forest land with interspersed areas held in private ownership. Management of the forest as a multi-use forest allows for grazing to occur over much of the watershed. Timber harvest and, consequently, primitive roads also occur throughout the watershed. Siltation into the lake from the past land management occurs at high rates and the maximum depth reported in 1994 for the reservoir was 9.5 feet.

Ownership of Lake and Adjacent Lakeshore Properties/Fishing Access:

The shoreline around the lake is public land owned and managed by the Forest Service. The Forest Service also has a small campground on the south shoreline of the lake that is currently managed under private contract. The campground offers a picnic shelter, outhouse and fishing pier.

Fishery Management History:

Management of the Dalton Lake fishery has been as a put and take rainbow trout fishery. Stocking records since 1947 show rainbow trout have been stocked nearly annually and brook trout were stocked in 1954 and 1956. No stockings of other fish species have been documented. Green sunfish were reported to be in the lake in extremely high numbers during a 1952 lake chemistry survey. The lake was drawn down during the previously mentioned sediment removal in 1960 and there have been no subsequent records of the sunfish.

Table 1. Stocking record for Dalton Lake, Lawrence County, 1995-2004.

Year	Species	Number	Size
1995	Rainbow trout	1,750	Catchable
	Rainbow trout	5	Adult
1996	Rainbow trout	1,730	Catchable
1997	Rainbow trout	1,125	Catchable
	Rainbow trout	25	Adult
1998	Rainbow trout	1,375	Catchable
1999	Rainbow trout	900	Catchable
	Rainbow trout	5	Adult
2000	Rainbow trout	675	Catchable
2001	Rainbow trout	1,150	Catchable
2002	Rainbow trout	625	Catchable
2003	Rainbow trout	225	Catchable
2004	Rainbow trout	425	Catchable
	Rainbow trout	25	Adult

FISHERY ASSESSMENT

The only netting survey on record for Dalton Lake was accomplished in August of 1994 and discussed in the Statewide Fishery Surveys, 1994 (Ronald Meester, Editor). The survey consisted of two ¾ inch frame net nights and one ¼ inch frame net night. Three species of fish were collected in the ¾ inch net (Table 2) and 79 golden shiners were collected in the ¼ inch net. A short discussion of hatchery rainbow trout and Dalton Lake is provided below.

Table 2. Catch data for all fish species collected from two ¼ inch frame nets in Dalton Lake, Lawrence County, 1994.

SPECIES	N	CPUE	Mean Length (mm)	Mean Weight (grams)
Golden Shiner	304	152	128.8	24.6
Brook Trout	2	1	280	246.5
Hatchery Rainbow Trout	1	0.5	213	76.0
Total	307			

Hatchery Rainbow Trout

Rainbow trout have been stocked into Dalton Lake annually to provide a put and take fishery. The lake most likely receives a moderate to high amount of fishing pressure due to the campground and picnic area so stockings have been necessary to provide a continued fishery. No recent fishery or creel surveys have been conducted so densities and condition of the trout are speculative. Within the last four years stockings have been reduced greatly (Table 1). Anecdotal information from anglers around the Black Hills will be used to determine if current stocking rates are keeping fish densities at levels that provide successful fishing.

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FIVE YEAR FISHERIES MANAGEMENT PLAN

Water: Iron Creek Lake

County: Lawrence

Present Plan: F-21-R-37

Date: Jan 1, 2005 to Dec 31, 2009

Previous Plan: F-21-R-29

Date: Jan 1, 1996 to Dec 31, 2000

Surface Area: 22 acres

Management Class: CWP

Maximum Depth: 34 feet

Mean Depth: 14.4 feet

Legal Description: Township 5N, Range 1E, Sections 27 and 29

MANAGEMENT GOAL

To optimize angling opportunities at Iron Creek Lake.

OBJECTIVES AND STRATEGIES

Objective 1. Maintain Iron Creek Lake's put and take rainbow trout fishery.

Strategy 1. Stock catchable rainbow trout periodically through the open water season to provide catch rates of no less than 0.50 trout per hour, similar to stated rates for the Black Hills streams (Erickson et al. 1993).

Action 1a. Continue stocking 11 and 15 inch trout monthly from April through June and in September at a rate near 320/surface acre/year.

Current Annual stocking schedule:

April	1,675 - 11" rainbow trout
	100 - 15" rainbow trout
May	1,675 - 11" rainbow trout
	100 - 15" rainbow trout
June	1,675 - 11" rainbow trout
	100 - 15" rainbow trout
September	1,675 - 11" rainbow trout
	100 - 15" rainbow trout

Note: During 2007 and 2008 Cleghorn Hatchery will be shut down and stockings will be temporarily reduced.

Objective 2. Keep the local Conservation Officer, US Forest Service and the public informed of fisheries management activities and solicit their input when planning future changes to the fishery.

Action 2a. Provide lake survey reports, creel reports, management plans and present data when requested/needed.

5 YEAR OPERATIONAL PLAN

1. Continue stocking rainbow trout at an annual rate near 320 fish per surface acre per year.

2. Conduct standard fisheries population surveys every 5 years (prior to updating the Iron Creek Lake Management Plan) utilizing four 24-hour frame net sets and 40 minutes of night-time electrofishing.
3. Analyze fishery survey data and publish the data in report form in Statewide Fisheries Surveys Annual Reports.
4. Conduct a thorough evaluation of the current management plan and complete a new plan by January 1, 2010

INVENTORY

Iron Creek Lake is a 26 acre impoundment located 10 miles south of Spearfish. The lake was formed in 1936 after impoundment of Iron Creek by the Works Project Administration and Civilian Conservation Corps. Iron Creek is the main drainage and originates a short distance above the lake from free flowing springs. No documented reclamation has occurred at the lake since its formation but substantial sediment loading has been noted by fish survey crews.

Ownership of Lake and Adjacent Lakeshore Properties/Fishing Access:

The lake and shoreline (120 feet wide around the lake) was deeded by a private individual to Lawrence County then sold to the Department of Game, Fish and Parks in 1969 for the sum of \$1.00. Only the lake proper and shoreline belongs to the GF&P. The dam is in Forest Service ownership and land around and above the lake is mostly in private ownership.

Fishery Management History:

Management of Iron Creek Lake has been as a stocked rainbow trout fishery. The fishery has been renovated on four different occasions (1950, 1960, 1967 and 1983) due to high densities of undesirable species in the reservoir. During 1950 the lake was chemically treated with rotenone to eradicate overabundant populations of white suckers and green sunfish. In 1960 the fishery was again high in densities of white suckers and green sunfish and chemically treated. From 1961 to 1967 white suckers rebounded and another attempt at chemical removal was made in Fall 1967. During these three fishery renovations only the lake was treated. During Fall 1983, in attempt to again remove an abundant sucker population, the lake was drawn down and the creek and dams above the reservoir and the reservoir itself were treated with rotenone. There have been no written records of white suckers since the 1983 treatment but the 2002 fishery survey shows illegal stockings have added at least seven other species into the reservoir.

Table 1. Stocking record for Iron Creek Lake, Lawrence County, 1995-2005.

Year	Species	Number	Size
1995	Rainbow trout	14,700	Catchable
	Rainbow trout	5,000	Fingerling
1996	Rainbow trout	16,609	Catchable
	Rainbow trout	5,006	Fingerling
1997	Rainbow trout	10,102	Catchable
	Rainbow trout	5,000	Fingerling

1998	Rainbow trout	10,881	Catchable
	Rainbow trout	5,000	Fingerling
1999	Rainbow trout	9,444	Catchable
	Rainbow trout	14,000	Fingerling
2000	Rainbow trout	9,150	Catchable
2001	Rainbow trout	9,149	Catchable
2002	Rainbow trout	6,239	Catchable
	Rainbow trout	10,892	Fingerling
2003	Rainbow trout	6,400	Catchable
2004	Rainbow trout	8,425	Catchable

FISHERY ASSESSMENT

A netting survey and night electrofishing survey were accomplished at Iron Creek Lake in 2002. The netting survey consisted of four ¼ inch frame net nights and two seine hauls with a 6.4 mm (1/4 inch) mesh bag seine, measuring 30.5 m (100 ft) long and 1.8 m (6 ft) deep. The electrofishing survey consisted of two 20 minute stations.

During trap netting seven species of fish were collected (Table 2). Only 1 species of the seven have been stocked by the Game, Fish and Parks Department. During seining an eighth species, emerald shiner, was also collected. Illegal introductions appear to be providing limited warm water fisheries in the reservoir.

Only largemouth bass were targeted during electrofishing and a total of 75 were caught in 40 minutes (Table 3). Largemouth bass collected from night electrofishing were generally small with the majority of fish measuring less than 8-inches long. Growth analyses showed largemouth bass in Iron Creek Lake grow slow compared with Region 1, state, and regional means of largemouth bass. Mean condition, however, was good with relative weight values at 101.4.

Table 2. Catch data from four-24 hour frame net sets at Iron Creek Lake on 22-23 July 2002. Total number, catch per net night (CPUE, 80% CI), catch per net night of stock length fish (CPUE-S, 80% CI), proportional stock densities (PSD, RSD-P with 90% CI), and condition factor (Wr for fish • stock length, 80% CI) were reported.

Species	N	CPUE	CPUE-S	PSD	RSD-P	Wr•S
Black bullhead	2	0.5 (0.5)	0.5 (0.5)	-	-	82.9 (0)
Black crappie	12	3.0 (3.8)	3.0 (3.8)	-	-	99.1 (1.3)
Golden shiner	29	7.3 (7.6)	-	-	-	-
Green sunfish	87	21.8 (28.7)	21.8 (28.7)	14 (6)	-	88.8 (1.0)
Hatchery rainbow trout	15	3.8 (6.1)	-	-	-	-
Largemouth bass	15	3.8 (6.1)	1.0 (1.6)	-	-	91.8 (5.7)

Yellow perch	32	8.0 (6.6)	8.0 (6.6)	34 (15)	3 (5)	83.6 (1.0)
<i>Total</i>	<i>192</i>					

Table 3. Catch data from night electrofishing passes on Iron Creek Lake, 6 August 2002.

Species	N	CPUE	CPUE-S	PSD	RSD-P	Wr•S
Largemouth bass	75	112.5 (41.6)	28.5 (32.3)	16 (15)	5 (9)	101.4 (4.8)

LITERATURE CITED

Erickson, J., R. Koth and L. Vanderbush. 1993. 1993 Black Hills Stream Management Plan. Progress Report. South Dakota Game, Fish and Parks. Pierre, South Dakota.

FIVE YEAR FISHERIES MANAGEMENT PLAN

Water: Horsethief Lake

County: Pennington

Present Plan: F-21-R-37

Date: Jan 1, 2005 to Dec 31, 2009

Previous Plan: F-21-R-25

Date: Jan 1, 1991 to Dec 31, 1996

Surface Area: 16.4 acres

Management Class: CWP

Maximum Depth: 35 feet

Mean Depth: 12.5 feet

Legal Description: Township 2S, Range 5E, Section 11

MANAGEMENT GOAL

To optimize angling opportunities at Horsethief Lake.

OBJECTIVES AND STRATEGIES

Objective 1. Maintain Horsethief Lake's put and take rainbow trout fishery.

Strategy 1. Stock catchable rainbow trout periodically through the open water season to provide catch rates of no less than 0.50 trout per hour, similar to stated rates for the Black Hills streams (Erickson et al. 1993).

Action 1a. Continue stocking 11 and 15 inch trout monthly from April through June and in September at a rate near 400/surface acre/year.

Current Annual stocking schedule:

<u>Month</u>	<u>No.</u>	<u>size / species</u>
April (early)	875	11" rainbow trout
April (early)	50	15" rainbow trout
April (late)	875	11" rainbow trout
April (late)	50	15" rainbow trout
May (mid)	875	11" rainbow trout
May (mid)	50	15" rainbow trout
June (mid)	875	11" rainbow trout
June (mid)	50	15" rainbow trout
August (mid)	875	11" rainbow trout
Sept (mid)	875	11" rainbow trout
Sept (mid)	50	15" rainbow trout
October (mid)	875	11" rainbow trout
October (mid)	50	15" rainbow trout

Note: During 2007 and 2008 Cleghorn Hatchery will be shut down and stockings will temporarily be reduced.

- Objective 2.** Keep the local Conservation Officer, US Forest Service and the public informed of fisheries management activities and solicit their input when planning future changes to the fishery.
- Action 2a. Provide lake survey reports, creel reports, management plans and present data when requested/needed.
-

5 YEAR OPERATIONAL PLAN

1. Continue stocking 11 inch catchable rainbow trout at an annual rate near 400 fish per surface acre per year and 15 inch at 3 per acre per year.
 2. Conduct standard fisheries population surveys every 5 years (prior to updating the Horsethief Lake Management Plan) utilizing a minimum of four 24-hour frame net sets and one 150-foot experimental gill net sets.
 3. Analyze fishery survey data and publish the data in report form in Statewide Fisheries Surveys Annual Reports.
 4. Conduct a thorough evaluation of the current management plan and complete a new plan by January 1, 2010.
-

INVENTORY

Horsethief Lake is a 16 acre impoundment located on Forest Service land about two miles west of Mount Rushmore National Monument. The lake was named for an early-day outlaw, Lame Johnny, and his band thought to have a hide-out in the area. The dam was constructed during the 1930's and is owned by the Forest Service. While the lake proper and surrounding facilities also belong to the Forest Service the Game, Fish and Parks manages the fishery.

The watershed is public forestland and the lake lies on the edge of the Black Elk Wilderness area. Pine Creek, which is the primary source for Horsethief Lake, originates within the wilderness area. Some siltation does occur and according to a sediment survey from the 1970's there was 15.2 acre-feet of sediment stored in the reservoir.

Emergent and submergent vegetation is primarily limited to the inlet and bay areas around the lake. Horsethief Lake also experiences periodic algal blooms which have been attributed to causing the partial fish kills reported at the lake. A lack of dissolved oxygen at depths greater than 20 feet has also been documented within the reservoir.

Ownership of Lake and Adjacent Lakeshore Properties/Fishing Access:

The shoreline around the lake is public land owned and managed by the Forest Service. The Forest Service has a campground on the west shoreline of the lake that is currently managed under private contract and access through the campground is limited to paying campers. Located on the southwest end of the lake near the Pine Creek inlet is a parking area, outhouses, fishing pier and planked walkway for use by the general public.

Fishery Management History:

Management of Horsethief Lake has been primarily as a rainbow trout fishery. Initial stockings were with fingerling trout but more recent stockings have been catchable size trout and larger. A chemical eradication using rotenone was accomplished in October 1966 to eliminate an overabundant white sucker population. The eradication appeared to be successful but during a lake survey in 1996, one white sucker was captured in a gill net. Illegal stockings have also introduced, at minimum, yellow perch and golden shiners to the reservoir.

Table 1. Department stocking records for Horsethief Lake, 1995-2004.

Year	Species	Number	Size
1996	Rainbow trout	12,090	Catchable
	Rainbow trout	48	Adult
1997	Rainbow trout	8,575	Catchable
	Rainbow trout	30	Adult
1998	Rainbow trout	8,800	Catchable
1999	Rainbow trout	8,450	Catchable
	Rainbow trout	10	Adult
2000	Rainbow trout	8,800	Catchable
2001	Rainbow trout	7,585	Catchable
2002	Rainbow trout	5,000	Catchable
2003	Rainbow trout	3,000	Catchable
2004	Rainbow trout	4,064	Catchable
	Rainbow trout	200	Adult

FISHERY ASSESSMENT

The last netting survey at Horsethief Lake was accomplished in June 1996 (Ronald Meester, Editor). The survey consisted of four 1 hour sets of 150 foot sinking, monofilament experimental gill nets. Two gill nets were set in the deeper portion of the lake and allowed to fish for one hour and then checked for fish (Table 3). The purpose of the short duration was to reduce mortality on hatchery rainbow trout with which the lake is managed. Only one rainbow trout was collected. The nets were reset in water only 6 to 8 feet deep and again allowed to fish for one hour. A total of four species of fish were collected during the survey (Table 2). The lone white sucker is the only one to be collected in test netting since the lake was chemically renovated in October 1966.

Table 2. Catch data for all fish species collected from four 1 hour experimental gill nets in Horsethief Lake, Pennington County, 1996.

SPECIES	N	CPUE	Mean Length (mm)	Mean Weight (grams)
Golden Shiner	105	26.3	158	47
Hatchery Rainbow Trout	11	2.8	312	267
White sucker	1	0.3	333	447
Yellow perch	52	13.0	142	34

Total	169
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LITERATURE CITED

- Erickson, J., R. Koth and L. Vanderbush. 1993. 1993 Black Hills Stream Management Plan. Progress Report. South Dakota Game, Fish and Parks. Pierre, South Dakota.
- Meester, R. 1996. Statewide Fisheries Surveys, 1996. Surveys of Public Waters: Part 1 Lakes - Region 1. Annual Report No 97-9. South Dakota Department of Game, Fish and Parks. Pierre, South Dakota.
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FIVE YEAR FISHERIES MANAGEMENT PLAN

Water: Pactola Reservoir

County: Pennington

Present Plan: F-21-R-37

Date: Jan 1, 2005 to Dec 31, 2009

Previous Plan: F-21-R-27

Date: Jan 1, 1992 to Dec 31, 1997

Surface Area: 785.3 acres

Management Class: CWP

Maximum Depth: 165.8 feet

Mean Depth: 62.3 feet

Legal Description: Township 1N, Range 5E, Sections 2,3,4,5,10,11 and
Township 2N, Range 5E and Sections 31,32,33,34

MANAGEMENT GOAL

To optimize angling opportunities at Pactola Reservoir.

OBJECTIVES AND STRATEGIES

Objective 1. Maintain Pactola Reservoir's put and take rainbow trout fishery.

Strategy 1. Stock catchable rainbow trout periodically through the open water season to provide catch rates near 0.50 trout per hour, similar to stated rates for the Black Hills streams (Erickson et al. 1993).

Action 1a. Continue stocking 11 inch trout from March through September at a rate near 33/surface acre/year.

Current Annual stocking schedule:

<u>Month</u>	<u>No.</u>	<u>size / species</u>
March	11,000	11" rainbow trout
June	4,000	11" rainbow trout
September	11,250	11" rainbow trout

Note: During 2007 and 2008 Cleghorn Hatchery will be shut down and stockings will be temporarily reduced.

Objective 2. To provide and maintain a unique trophy lake trout population within the reservoir through large (15 inch) stockings every 3 to 5 years.

Strategy 2a. Evaluate the lake trout stockings through standard fishery surveys, creel surveys, and anecdotal angling information.

- Action 2a. Stock 15 inch lake trout at a rate near 15 per surface acre every 3 to 5 years.
- Objective 3.** Monitor zooplankton ratio's (ZPR) and determine if optimal stocking densities can be determined in part by ZPR values.
- Strategy 3a. Collect ZPR samples monthly to bi-monthly throughout the summer and run correlations of the ratio's with stocking rates, temperature, dissolved oxygen, conductivity, pH, turbidity, light availability, secchi depths, fish condition, phosphorous, chlorophyll A and combinations within.
- Objective 4.** Keep the local Conservation Officer, US Forest Service and the public informed of fisheries management activities and solicit their input when planning future changes to the fishery.
- Action 4a. Provide lake survey reports, creel reports, management plans and present data when requested/needed.
-

YEAR OPERATIONAL PLAN

1. Continue stocking catchable rainbow trout at an annual rate near 33 fish per surface acre per year or at levels determined conducive to good growth and condition.
 2. Stock 11 inch lake trout at a rate near 15 per surface acre every 3 to 5 years.
 3. Conduct standard fisheries population surveys annually utilizing a minimum of twelve 24-hour 150-foot experimental gill net sets.
 4. Collect ZPR sampling monthly to bi-monthly throughout the summer.
 5. Analyze fishery survey data and publish the data in report form in Statewide Fisheries Surveys Annual Reports.
 6. Conduct a thorough evaluation of the current management plan and complete a new plan by January 1, 2010.
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INVENTORY

Pactola Reservoir is a 785 acre impoundment located 15 miles west of Rapid City. Construction of Pactola Dam on Rapid Creek began in November 1952 and was completed during August 1956. Water became available for irrigation and domestic use from Pactola Reservoir on May 1, 1958. The reservoir is a deep, coldwater lake with a maximum depth near 165 feet, mean depth around 62 feet and capacity of 99,000 acre-feet of water. Pactola Dam and Reservoir are operated and maintained by the Bureau of Reclamation on a pooled storage basis with Deerfield Reservoir (Rapid Valley Project).

The majority of the watershed is public timber and grassland managed by the U.S. Forest Service (USFS), but substantial areas of private ownership also exist within the area. Much of the land immediately adjacent to streams within the Rapid Creek watershed is privately owned with a small portion under tillage. Livestock grazing is widespread on both private and public lands. Most public land is under management for production of saleable timber products. Extensive thinning of ponderosa pine on public land has taken place or is under way to enhance water yield. Roads and livestock grazing are major sources of sediment in the streams. Mountain slopes vary from moderate to extreme steepness on the lake shore as well as throughout the watershed and localized disturbances contribute to increased siltation.

Deerfield Reservoir is located on the upper portion of the Castle Creek watershed above Pactola Reservoir. Slate Creek Dam, Dumont Pond, and many small, unnamed stock ponds and beaver ponds are also located within the Rapid Creek watershed above Pactola. In addition, Silver City, Rochford, and several small developments are also located in the upper Rapid Creek watershed.

Ownership of Lake and Adjacent Lakeshore Properties/Fishing Access:

The shoreline around the lake is public land owned and managed by the USFS. USFS has jurisdiction over campgrounds, picnic areas, boat launches, access areas, and shoreline use. Access to boat launches requires a daily recreation fee or USFS park entrance permit. Camping, marina, and concession operations at the reservoir are leased to private individuals and businesses. The USFS also maintains a visitor center, three parking lots, and overlook areas on the dam. A handicap parking lot with fishing access piers, referred to as Veteran's Point, is located at the north end of the dam.

Fishery Management History:

Management of Pactola Reservoir's fishery has been as a rainbow trout fishery. Initial stockings were with fingerling trout as a put, grow and take fishery but more recent stockings have been catchable size trout and larger.

Shortly after impoundment, populations of white sucker, black bullhead and green sunfish dominated the fishery. Reduced water levels from irrigation and little precipitation made it possible to chemically treat the fishery and restock with fingerling trout. In October of 1961, toxaphene was applied in two doses within a 7-day interval. During treatment fisheries personnel also treated Castle Creek, Nugget Creek, Slate Creek, the north and south forks of Rapid Creek and Rapid Creek proper.

Pactola is a deep, cold water reservoir with historically little forage for producing large trout. In attempt to develop a coldwater prey base rainbow smelt were netted near Mobridge in 1984 and transferred to Pactola. Other smelt trap and transfer efforts from the Missouri to Pactola were accomplished in the early 1990's.

Other past management at Pactola has been as a "dumping grounds" for excess trout. In 1977, lake trout destined for the Missouri River were determined to be in poor condition and not likely to make the 3 to 4 hour trip to the river. The lake trout were stocked into Pactola (and again in 1978) and have added a trophy aspect to the reservoir's fishery.

Other notable historic fish stockings were: kokanee salmon (multiple years from 1971 to 1984), cutthroat trout (multiple years from 1985 to 1992), splake trout (1985, 1988) and spottail shiners (1992).

Table 1. Department stockings for Pactola Lake, 1995-2004.

Year	Species	Number	Size
1996	Rainbow trout	116,212	Catchable
1997	Rainbow trout	73,019	Catchable
	Rainbow trout	40	Adult
1998	Rainbow trout	67,494	Catchable
1999	Rainbow trout	42,500	Catchable
2000	Rainbow trout	13,789	Catchable
	Brown trout	2,911	Catchable
2001	Rainbow trout	40,000	
2002	Rainbow trout	40,818	Catchable
	Brown trout	7,922	Catchable
2003	Rainbow trout	32,100	Catchable
	Lake trout	9,955	Catchable
2004	Rainbow trout	29,593	Catchable
	Rainbow trout	180	Adult

FISHERY ASSESSMENT

Twelve 24 hour, 150 foot experimental 150 gill nets are used to collect fish at Pactola Reservoir annually. During the 2004 survey ten species of fish were collected (Table 2). Hatchery rainbow, brown trout, and lake trout were the most abundant fish caught in 2004. All other species were caught in relatively low numbers.

Table 2. Total catch of twelve 150-foot, experimental, sinking, monofilament gill nets set on Pactola Reservoir, Pennington County, South Dakota from 3-4 August 2004.

Species	N	%	CPUE
Hatchery/wild brown trout	52	27.2	4.3
Hatchery rainbow trout	71	37.3	5.9
Lake trout	51	26.7	4.3
Largemouth bass	1	0.5	0.1
Bluegill	1	0.5	0.1
Rock bass	2	1.0	0.2
White sucker	10	5.2	0.8
Yellow perch	1	0.5	0.1
Rainbow smelt	1	0.5	0.1
Green sunfish	1	0.5	0.1
Totals	191	100	

Hatchery Rainbow Trout

The number of hatchery rainbow trout sampled ranged from 151 in 2002, 149 in 2003 and 71 in 2004. The hatchery rainbow trout condition has remained low over the last few years. Mean W_r was 79.1 in 2002 and 71.3 in 2004 (Table 3). The length frequencies of caught hatchery trout showed that very few rainbow trout are getting to and exceeding 14 inches (350 mm) in length.

Table 3. W_r values for rainbow trout from Pactola Reservoir, Pennington County, South Dakota from 2002-2004.

Year	Mean W_r	$W_r < 350$ mm	$W_r > 350$ mm
2002	79.1	78.8	82.9
2003	74.1	74.8	69.6
2004	71.3	71.3	72.6

Lake Trout

The mean length of stocked lake trout was 303 mm in 2003 and 293 mm in 2004. Lengths of sampled lake trout indicate no growth after 1 year of being stocked. A single lake trout greater than 350 mm was caught and had a higher W_r (90.8) than the mean (83.3) for those under 350 mm. A couple of lake trout stomachs were examined during sampling and had fish remains present. Two lake trout caught (135 mm total length) were not adipose fin clipped, indicating natural reproduction is occurring.

Brown Trout

The number of brown trout caught in gill nets was 97 in 2002, 84 in 2003, and 52 in 2004 (Figure 1). Naturally reproduced brown trout from Rapid Creek above the reservoir have consistently been caught from Pactola, but some of these fish were stocked in 2000 and 2002 (about 11,000 trout total). The W_r 's continue to average in the 80's. Several brown trout stomachs were examined and found to contain rock bass and other fish remains. There continues to be a small proportion of brown trout larger than 350 mm (14 inches), which have exceptionally high W_r values. These fish are important components to the "trophy" fishing at Pactola.

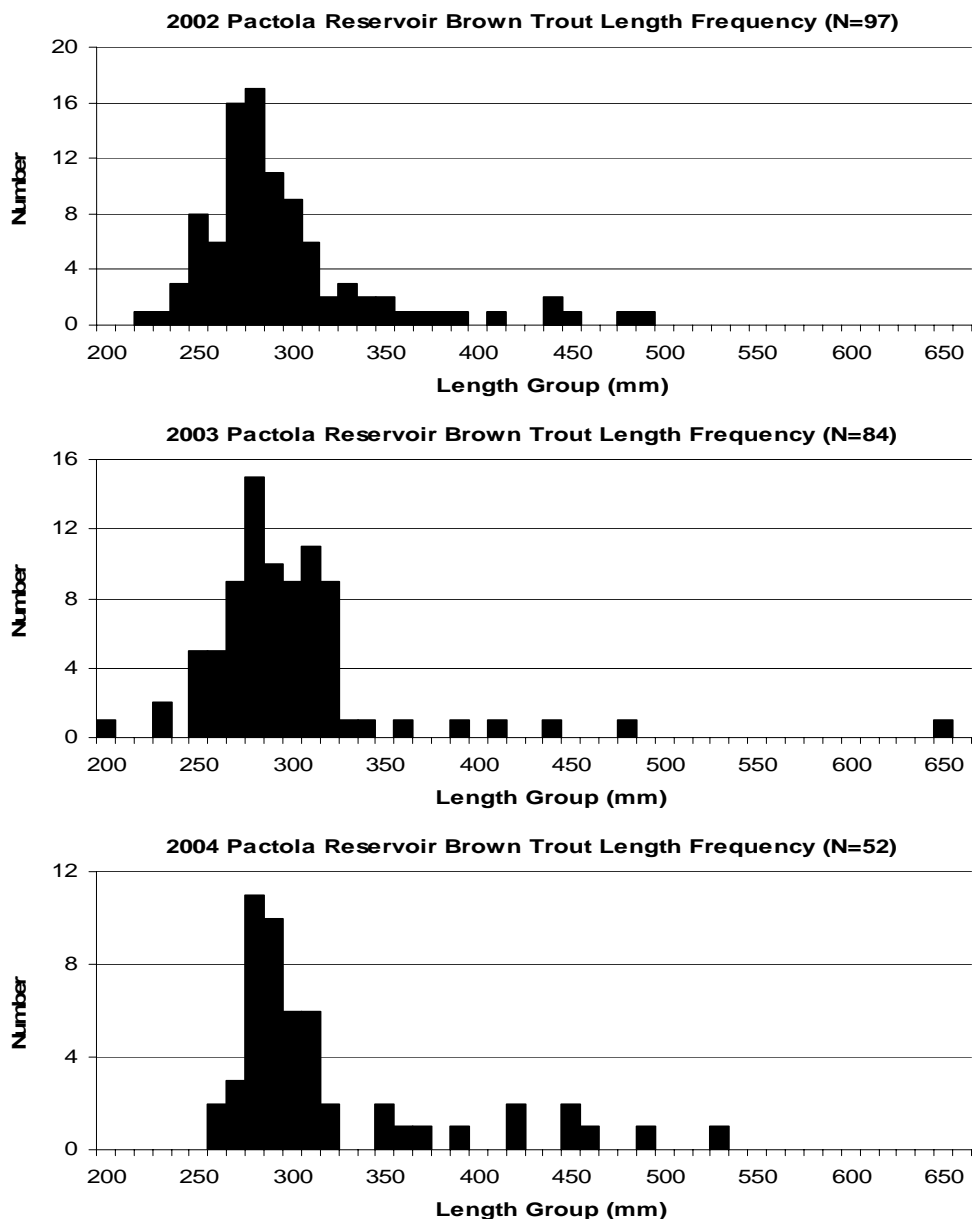


Figure 1. Length frequency histograms for brown trout collected from Pactola Reservoir, South Dakota, 2002-2004.

ZPR

The zooplankton ratio data for Pactola Reservoir is presented in Table 4. The mean ZPR (750:153) at site A in 2004 was 0.113 and the mean zooplankton length was 1.15 mm. These values are below the objectives of 0.2 and 1.0 mm, respectively.

Table 4. ZPR values at sites A and B for Pactola Reservoir, Pennington County, South Dakota.

Reservoir	Site	Date	ZPR (750:153)	ZPR (750:500)	Zooplankton Length (mm)
Pactola	A	03 Jun 04	0.01	0.26	0.93
Pactola	A	14 Jun 04	0.05	0.82	1.52
Pactola	A	06 Jul 04	0.14	0.86	1.56
Pactola	A	26 Jul 04	0.09	0.43	1.11
Pactola	A	06 Aug 04	0.12	0.27	0.94
Pactola	A	24 Aug 04	0.05	0.11	0.78
Pactola	A	22 Sep 04	0.33	0.46	1.15
		Mean	0.11	0.46	1.15
Pactola	B	03 Jun 04	0.01	0.35	1.03
Pactola	B	14 Jun 04	0.02	0.23	0.90
Pactola	B	06 Jul 04	0.03	0.08	0.74
Pactola	B	26 Jul 04	0.01	0.18	0.85
Pactola	B	06 Aug 04	0.02	0.10	0.77
Pactola	B	24 Aug 04	0.01	0.16	0.83
Pactola	B	22 Sep 04	0.04	0.61	1.30
		Mean	0.02	0.24	0.92

LITERATURE CITED

Erickson, J., R. Koth and L. Vanderbush. 1993. 1993 Black Hills Stream Management Plan. Progress Report. South Dakota Game, Fish and Parks. Pierre, South Dakota.

FIVE YEAR FISHERIES MANAGEMENT PLAN

Water: Flat Creek Lake

County: Perkins

Present Plan: F-21-R-37

Date: Jan 1, 2005 to Dec 31, 2009

Previous Plan: F-21-R-29

Date: Jan 1, 1996 to Dec 31, 2000

Surface Area: 203 acres

Management Class: WSP

Maximum Depth: 24 feet

Mean Depth: 8 feet

Legal Description: Township 21N, Range 16E, Sections 20 & 21

MANAGEMENT GOAL

To optimize angling opportunities in Flat Creek Lake.

OBJECTIVES AND STRATEGIES

Objective 1. Increase walleye numbers to a moderate density and maintain a balanced population with good individual growth.

Strategy 1. Increase gill-net CPUE for stock-length walleye to a minimum of 10*, a PSD range of 30-60, an RSD-P of 5 or greater, and a growth rate of 35.5 cm (14 in) at age-3.

Action 1a. Evaluate the walleye population by conducting lake netting surveys every 2 to 5 years and night-time electrofishing every 1 to 2 years.

Action 1b. Stock advanced walleye fingerlings at a rate of 1 to 2 lbs per surface acre (5 to 10 advanced fingerlings per surface acre) when supplementing the population is deemed necessary.

Objective 2. Increase largemouth bass numbers to a moderate density and maintain a balanced population with good individual growth.

Strategy 2. Increase night-time electrofishing CPUE for stock-length fish to a minimum of 20*, a PSD range of 40 to 70 and RSD-P greater than 10 and growth rates at or near the statewide average.

Action 2a. Evaluate the largemouth bass population by conducting night electrofishing, coinciding with lake surveys.

Action 2b. Stock adult bass at a rate of 1 lb per surface acre (2 to 3 adults per surface acre) to supplement the existing population when deemed necessary.

Objective 3. Decrease black bullhead density and improve size structure.

Strategy 3a. Reduce and maintain trap net CPUE of stock-length and longer black bullheads equal to or less than 50.

Action 3a. Maintain predator densities (i.e. walleye, largemouth bass, northern pike) at levels that, in addition to harvest, will effectively maintain black bullhead numbers within objective ranges.

Action 3b. Evaluate the black bullhead population by conducting standard population surveys every 3 to 5 years to determine density and condition.

Objective 4. Reach and maintain balanced levels for black crappie and bluegill populations within the lake.

Strategy 4a. Improve and maintain PSD's between 20 and 60, and RSD-P's of 5 or greater.

Action 4a. Maintain predator densities (i.e. walleye, largemouth bass, northern pike) at levels that, in addition to harvest, will effectively keep panfish numbers within objective ranges.

Action 4b. Evaluate the black crappie and bluegill populations by conducting standard population surveys every 3 to 5 years to determine density, growth and condition.

Objective 5. Keep the local Conservation Officer and the public informed of fisheries management activities and solicit their input when planning future changes to the fishery.

Action 5a. Provide lake survey reports, creel reports, management plans and present data when requested/needed.

*Labeling fish population densities as high, moderate and low provides a defining characteristic of the population. Identifying densities by catch per unit effort (CPUE) values, however, is subject to many variables (conductivity, turbidity, temperature, etc) and not necessarily equal for all fish communities. While CPUE has been used to correlate densities of fish populations (Hall 1986; Gablehouse 1987; Coble 1992) stock density values have been identified for different management strategies (Gablehouse 1984; Willis et al. 1993). The above strategies have specific CPUE values listed for population densities but should remain secondary to stock density values when determining if an objective is accomplished or not.

5 YEAR OPERATIONAL PLAN

1. Conduct standard fisheries population surveys every 3 to 5 years utilizing eight 24-hour frame net sets, a minimum of two 150-foot experimental gill net sets and four 10-minute night electrofishing stations.
 2. Analyze fishery survey data and publish the data in report form in Statewide Fisheries Surveys Annual Reports
 3. If netting indicates walleye density is too low to meet the stated objective values then stock advanced fingerlings at a rate of 1 to 2 lbs per surface acre (5 to 10 advanced fingerlings per surface acre) to supplement the population and consider angler harvest with a more restrictive regulation.
 4. If netting indicates walleye density is too high then consider angler harvest and a different regulation and/or use Flat Creek Lake as a source for stocking other local walleye fisheries.
 5. If electrofishing reveals largemouth bass densities too low to meet the stated objective values then stock adult largemouth bass at a rate of 1 lb per surface acre (2 to 3 adults per surface acre) to supplement the population.
 6. If largemouth bass densities appear too high to accomplish the stated objective values then consider Flat Creek Lake as a source for supplementing other public largemouth bass fisheries.
 7. Conduct a thorough evaluation of the current management plan and complete a new plan by January 1, 2010
-

INVENTORY

Flat Creek Lake is a 203-acre impoundment located 11 miles south of Lemmon, SD. The impoundment was constructed in the 1930's by the Works Progress Administration and is approximately 1 mile up Flat Creek from the Grand River in northern Perkins County. Easements were obtained in January of 1934 (pgs 183 and 186, Perkins County Book) granting public use upto 12 feet above the high water mark around the reservoir.

On November 10, 1953, the South Dakota Game, Fish and Parks Department purchased the western half and southeast quarter of Section 18, Township 21 North, Range 16 East. The Llewellyn Johns Recreation Area is located on this southwest side of the reservoir and offers 10 campsites with electricity and water, outhouse accommodations and a picnic shelter.

The watershed is approximately 160 square miles, of which around 80 square miles are in South Dakota and the rest in North Dakota. The watershed is primarily rangeland ($\approx 55\%$) and cropland ($\approx 45\%$). Soil type is mostly sandy-loamy soils and the lake is dependent upon runoff from snow and rain within the watershed. The lake bottom is mostly mud/muck with some gravels/rubble evident around the shoreline. Although reports were of bare shoreline during the 1960's when a cattle feedlot was adjacent to the lake, currently cattails and bulrush are found abundantly around both the upper and lower ends of the lake. Water quality at Flat Creek Lake was reportedly poor during the 1960's due to the feedlot. Closure of the feed lot by the South Dakota Department of Health in 1971 has led to improved water quality which has remained satisfactory since the closure.

Ownership of Lake and Adjacent Lakeshore Properties/Fishing Access:

Around 50% of the shoreline is public and the rest is in private ownership. The Game, Fish and Parks Department has an easement around the reservoir for shoreline fishing. Shoreline access is easily accomplished from the highway and the Llewellyn Johns Recreation Area. While no established boat ramp exists at the reservoir a break in shoreline vegetation on the southeast shore is currently being used as a boat ramp.

Fishery Management History:

Management of the Flat Creek Lake fishery has been as a multiple species lake focusing on northern pike, black crappie and walleye. Northern pike and black crappie have been reported to be the more popular species fished for and anglers have commonly reported catching large northern pike at the reservoir. Black crappie and bluegill have historically been reported as numerous and small to average size which continues to be the case today.

Past management efforts at Flat Creek Lake have included shoreline applications of rotenone, commercial fishing and stocking fish. Shoreline rotenone applications were accomplished in July 1968 in attempt to reduce the bluegill population by targeting age-0 fish. The application was reported to be successful at reducing bluegill density and in 1969 rotenone applications were tried again but did not appear to have the same success. Commercial fishing for black bullheads was also attempted in July 1969. It was determined, however, the mechanical removal was impractical and never tried again. As for stocking, six species of fish have been stocked over the past 20 years; black crappie, bluegill, channel catfish, largemouth bass, northern pike and walleye. Stockings continue to be an important part the fisheries management effort and efforts since 1990 are included in Table 1.

Table 1. Stocking record for Flat Creek Lake, Perkins County, 1990-2004.

Year	Species	Number	Size
1991	Walleye	20,000	Fingerling
1995	Northern pike	78	Adult
	Northern pike	115	Adult
	Northern pike	150	Adult
	Black crappie	400	Adult
	Largemouth bass	4,500	Fingerling
1996	Black crappie	500	Adult
	Northern pike	17,000	Fingerling
	Northern pike	86	Adult
	Northern pike	96	Adult
1997	Black crappie	500	Adult
	Northern pike	168	Adult
	Northern pike	34,000	Fingerling
2003	Largemouth bass	2,700	Fingerling
	Walleye	1,144	Large Fingerling
2004	Walleye	6,355	Large Fingerling
	Largemouth bass	1,124	Adult

FISHERY ASSESSMENT

A netting survey of Flat Creek Lake's fish population was conducted from July 9th to 11th, 2003 (Tables 2 and 3) and night electrofishing was last completed on September 28th, 2004 (Table 4). The netting survey consisted of 2 gill net nights and 8 trap net nights while the fall night electrofishing was made up of 4 ten-minute stations. A total of eleven species of fish were collected throughout the different surveys and discussions on the more common and popular angling species are included in the following text.

Table 2. Catch data for all fish species collected from two 150-ft experimental sinking gill nets in Flat Creek lake, Perkins County, 2003.

SPECIES	N	CPUE	CPUE-S	PSD	RSD-P	Wr • S
Black bullhead	210	105.0 (52.3)	105 (52.3)	0	0	87.6 (1.4)
Channel catfish	5	2.5 (1.5)	1.5 (1.5)	0	0	103.6 (5.5)
Common carp	12	6.0 (6.2)	6.0 (6.2)	92 (15)	0	85.3 (1.9)
Northern pike	4	2.0 (3.1)	2.0 (3.1)	--	--	92.6 (8.6)
White sucker	1	0.5 (1.5)	0.5 (1.5)	--	--	89.5 (--)
Yellow perch	11	5.5 (13.9)	5.5 (13.9)	0	0	87.6 (1.6)
Total	243					

Table 3. Catch data for all fish species collected from eight ¾-inch trap nets in Flat Creek Lake, Perkins County, July 9-11, 2003.

SPECIES	N	CPUE	CPUE-S	PSD	RSD-P	Wr • S
Black bullhead	790	112.9 (30.3)	--	--	--	--
Black crappie	316	45.1 (14.2)	45.1 (14.2)	13 (3)	0	99.2 (0.9)
Bluegill	340	48.6 (16.8)	48.6 (16.8)	43 (5)	0	97.8 (1.5)
Bluegill X Green sunfish	3	0.4 (1.6)	--	--	--	--
Channel catfish	21	3.0 (1.5)	2.9 (1.3)	10 (12)	0	90.7 (2.1)
Common carp	16	2.3 (1.3)	2.3 (1.3)	94 (11)	0	80.2 (0.6)
Northern pike	8	1.1 (0.5)	1.1 (0.5)	100	75 (31)	86.6 (3.2)
Yellow perch	54	7.7 (5.0)	7.7 (5.0)	0	0	84.7 (0.7)
Total	1,548					

Table 4. Catch data for largemouth bass and walleye collected by electrofishing in Flat Creek Lake, Perkins County, September 28, 2004.

Species	N	CPUE	CPUE-S	PSD	RSD-P	Wr>S
Largemouth bass	20	28.6 (12.2)	15.0 (9.4)	82 (22)	64 (28)	116.6 (4.3)
Walleye	17	23.6 (4.6)	7.0 (2.8)	40 (52)	40 (52)	90.5 (6.1)

Panfish/Bullheads

Black crappie, bluegill and black bullheads were caught in large numbers in the frame nets and bullheads were also present in larger numbers in the gill nets (Tables 3 and 4). The combination of low stock density (PSD, RSD-P) values and high catch values of adult fish (CPUE > 45 for each of the three species), indicates there is a lack of predators in the lake.

While mean condition (Wr) for bullheads was low at 87.6, mean Wr of crappie and bluegill was good, 99.2 and 97.8, respectively, suggesting there is high potential for growing larger panfish in this lake. The key to this is most likely increasing predator numbers to a reasonable density at which they can affectively reduce numbers of bullheads and panfish.

Largemouth Bass

Flat Creek Lake's bass population appears to be improving. While only 2 adult bass were caught during 60 minutes of electrofishing in 2003 (Galinat and Miller 2004), 11 were caught in 40 minutes of electrofishing in 2004. Most likely the increase was due to stockings of adult bass in 2004 since most of these fish were greater than 12 inches in length (Figure 1). It also appears the 2003 fingerling stockings were somewhat successful or reproduction is occurring as 9 bass between 5 and 7 inches were also caught during electrofishing.

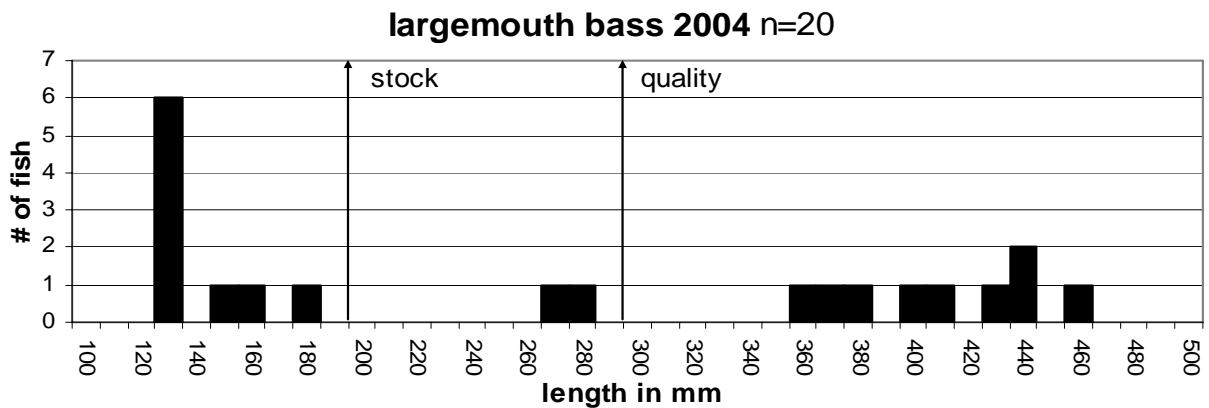


Figure 1. Length frequency histogram of largemouth bass from fall electrofishing at Flat Creek Lake, 9/28/2004.

Northern Pike

Anecdotal information from anglers indicates Flat Creek Lake has had a good population of large northern pike in the past and they are a popular target for local fishermen. Northern pike were found in low numbers during netting (Tables 2 and 3). Possibly the large numbers of bullheads, crappies and bluegill have been keeping the predator (i.e. northern pike, as well as, largemouth bass and walleye) numbers low.

Walleye

While no walleye were caught during the 2003 netting survey, 17 walleye were caught during night electrofishing in 2004 of which 2 were over 20 inches in length. The Game, Fish and Parks had not stocked the reservoir since 1991 when 20,000 fingerling walleye were added to the lake (Table 1). Conversations with local residents, however, indicate local anglers may have been stocking walleye on their own.

In attempt to improve the walleye fishery the Game and Fish stocked large fingerlings in Fall 2003 and again in Fall 2004 (Table 1). It is intended that building the walleye (and bass) population will reduce panfish numbers, thereby increasing sizes of panfish and improving recruitment of walleye (and bass) in the lake.

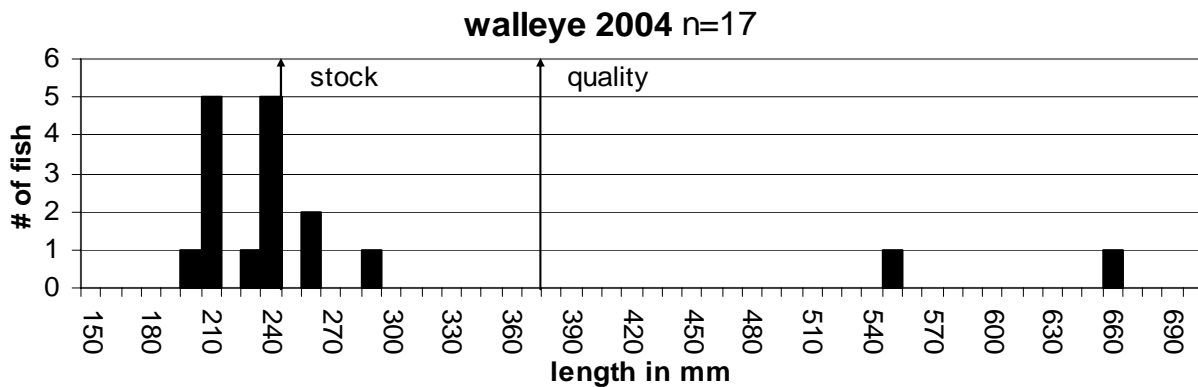


Figure 2. Length frequency histogram of walleye from fall electrofishing at Flat Creek Lake, 9/28/2004

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FIVE YEAR FISHERIES MANAGEMENT PLAN

Water: Pocasse

County: Campbell

Present Plan: F-21-R-37

Date: January 2005 to December 2009

Previous Plan: F-21-R-32

Date: January 2000 to December 2004

Surface Area: 1800 acres

Management Class: WWP

Maximum Depth: 17 feet

Mean Depth: 6 feet

INVENTORY

Lake Pocasse is an 1800-acre impoundment located on the lower end of Spring Creek adjacent to the city of Pollock in northwestern Campbell County. The residents of the Pollock area named Pocasse after a Sioux Indian Chief during final construction of the dam. The U.S. Corps of Engineers completed the dam grade creating Lake Pocasse in 1961 as part of the Missouri River Reservoir system. Title to the lake and adjacent lands is with the Corps of Engineers as recorded in Miscellaneous Book 10, pages 289 and 290 in the Campbell County Register of Deeds office in Mound City, South Dakota. Lake Pocasse and the adjacent land will become property of the State of South Dakota in the near future with the Title 19 land transfer taking place within the next five years. Currently, fisheries management at Pocasse is completed by the South Dakota Dept. of Game Fish & Parks with the U.S. Fish and Wildlife Service managing the area as a migratory bird refuge.

The watershed for Lake Pocasse is 585,500 acres, 90% of which is privately owned agricultural land consisting of cultivated cropland, hayland and pasture. The remaining 10% is made up of towns, farmsteads and roads. Topography in the watershed varies from nearly level to rolling with moderate slopes. A variety of soil types and textures are found from uplands of firm glacial till with clay subsoils and lower lands of medium textured soils with clay subsoils. Native grasses border the immediate shoreline. Vegetation in Lake Pocasse is mainly limited to bulrush that is found along the entire shoreline. There is very little submergent vegetation present. Access is good with a park maintained by the city of Pollock and concrete boatramp located on the southwest edge of the lake. From the outlet of Lake Pocasse water overflows the spillway directly into the Oahe Reservoir on the Missouri River. The spillway at Lake Pocasse is unique in the respect that when the Oahe Reservoir exceeds elevations of 1617 msl, water reverses flow and enters Pocasse from Lake Oahe through the spillway.

Since the time of its construction, Lake Pocasse has provided a good fishery consisting mainly of northern pike and black crappie. The first lake survey was complete 1967 when the Corps of Engineers turned fisheries management over to the South Dakota Dept. of Game, Fish and Parks. Northern pike, black crappie and black bullheads were the most frequently sampled species during this first survey. No records are available from the United States Fish and Wildlife Service, but local residents provided information that northern pike, walleye, and black crappie were stocked prior to the 1967 survey. In 1969 commercial fishing removed black bullhead, carp, buffalo and white suckers from Pocasse.

Lake Pocasse maintained a sustained fishery for pike and crappie throughout the 1970s with very little additional fish stocking. During the 1980s Lake Pocasse received several stockings of northern pike, yellow perch and black crappie and was the primary source for collection of northern pike eggs for GF&P's fish hatcheries. The lake was completely drained during the summer of 1992 to complete repairs to the dam grade and control structure. The lake refilled in the spring of 1993. Restocking efforts began in 1993 with 900,000 northern pike fry being placed in the lake. Fingerling stockings of northern pike were also completed in 1994 and 1995. Black crappie and yellow perch were stocked in 1995. Walleyes were reintroduced to Pocasse in 1998 and have provided a moderate fishery since. In 2003 yellow perch and black crappies were again stocked in an attempt to increase the forage base and provide a quality panfish opportunity.

Stocking record for Lake Pocasse, Campbell County.

YEAR	NUMBER	SPECIES	SIZE
1993	900,000	NOP	FRY
1994	90,287	NOP	FGL
1995	7,070	YEP	FGL
1995	1,303	BLC	ADT
1995	90,000	NOP	FGL
1998	180,000	WAE	FGL
2000	675	BLC	ADT
2003	520	YEP	ADT
2003	5,484	YEP	JUN
2003	1,180	BLC	ADT

During the spring of 1997, a large volume of runoff from the Spring Creek drainage combined with high elevation levels on Lake Oahe allowed fish transfer between Pocasse and Lake Oahe for most of the summer. Many fish species entered the lake from both the watershed and Oahe.

Lake Pocasse was most recently surveyed during May of 2003. Four, 150 foot experimental gill net sets and twelve, ¾ inch frame net sets were used to sample the fish species, abundance and composition. Ten species of fish were found to be present in Lake Pocasse, four of which were rough-fish including black bullhead, the most abundant species sampled.

**Total catch of four, 150 ft. experimental gill nets at Lake Pocasse, Campbell County,
May 27-29, 2003.**

Species	#	%	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean W_r
Northern Pike	17	33.3	4.5	± 2.0	6.8	82	18	87
Walleye	12	23.5	3.0	± 0.9	1.4	67	58	88
Black Bullhead	7	13.7	1.8	± 1.9	19.4	100	100	96
Channel Catfish	6	11.8	1.5	± 1.1	5.4	100	100	94
White Sucker	5	9.7	0.3	± 0.4	2.3	100	60	102
Freshwater Drum	1	2.0	0.3	± 0.4	0.3	--	--	110
Shorthead Redhorse	1	2.0	0.3	± 0.4	0.06	--	--	94
White Bass	1	2.0	0.3	± 0.4	0.06	--	--	101
Yellow Perch	1	2.0	0.3	± 0.4	1.1	--	--	87

* Four year mean (1994, 1997, 1999, 2001)

**Total catch of twelve, overnight ¾-inch frame nets at Lake Pocasse, Campbell
County, May 27-29, 2003.**

Species	#	%	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean W_r
Black Bullhead	201	75.0	16.8	± 4.6	87.2	100	98	84
White Bass	26	9.7	2.2	± 1.3	0.3	100	96	100
Channel Catfish	14	5.2	1.2	± 0.6	0.8	86	79	99
Northern Pike	9	3.4	0.8	± 0.3	9.5	89	33	77
Black Crappie	7	2.6	0.6	± 0.4	0.08	100	71	97
Common Carp	5	1.9	0.4	± 0.3	5.2	100	100	102
Walleye	4	1.5	0.3	± 0.3	0.3	--	--	99
Shorthead Redhorse	1	0.4	0.08	± 0.1	0.0	--	--	110
Yellow Perch	1	0.4	0.08	± 0.1	0.03	--	--	84

* Four year mean (1994, 1997, 1999, 2001)

The 2003 survey reveled that Lake Pocasse had a very low-density walleye population. The gill net CPUE was only 3.0, which is up from the past four survey mean of 1.4. Their growth is excellent compared to the statewide, regional and SLI means and their condition is good with a Wr value of 88. There is plenty of forage in the lake to feed the predators.

There were a number of other species sampled during this survey, but none of them in great numbers. The other species include northern pike, black bullhead, channel catfish, white sucker, freshwater drum, shorthead redhorse, white bass, yellow perch, and common carp. All species sampled appeared to be in good condition, but in lower densities.

The black bullheads were the dominant species sampled during the 2003 survey period. Their CPUE was 16.8 for trap nets and 1.8 for gill nets, which are both well below the four year means. Bullhead condition is good with an average Wr of 90.

MANAGEMENT GOAL

To manage the fishery at Lake Pocasse to maximize angling opportunity.

OBJECTIVES AND STRATEGIES

Objective 1. Increase walleye density to a gill net CPUE of 8 and a PSD of 40 to 80.

Strategy 1a. Monitor walleye populations to determine density and population structure.

Strategy 1b. Stock small walleye fingerlings as needed to supplement existing population.

Objective 2. Maintain northern pike densities at a frame-net CPUE of 5 or greater.

Strategy 2a. Monitor northern pike populations to determine density, growth and condition.

Objective 3. Increase black crappie densities to a minimum frame-net CPUE of 10 with growth and condition at or above the state average.

Strategy 3a. Stock black crappie adults and evaluate results.

Objective 4. Maintain black bullhead densities at a trap-net CPUE of less than 50 with a PSD greater than 80.

Strategy 4a. Increase predator (walleye and northern pike) densities to a level that significantly limits black bullhead recruitment.

Objective 5. Increase yellow perch densities to a gill net CPUE of 10 and a PSD range of 40 to 60.

Strategy 5a. Stock yellow perch adults as needed to increase densities and provide brood stock for consistent recruitment.

Objective 6. Inform, receive, and use continuing input from the public and other agencies to assist in the management of Lake Pocasse.

5 YEAR OPERATIONAL PLAN

1. Conduct lake population surveys during the summer of 2005 and 2008 using four, 150 foot experiment gill-net sets and twelve, ¾ inch frame-net sets to monitor all fish species.
2. Stock with small walleye fingerlings at a rate of 100/acre in 2006. Supplementaly stock small walleye fingerlings the year following lake survey if natural reproduction is not evident.
3. Stock black crappie and yellow perch adults at a rate of 10 per acre in 2005 and 2006 if 2005 lake survey results show a CPUE of less than 5 for each species.
4. The local Conservation Officer and other GF&P staff should solicit input from local bait shops and The Campbell County Sportsman's Club and provide input back to the ARS-Fisheries on a timely basis.
5. Conduct a thorough evaluation of the present management plan and complete a new plan by January 2005.

Completed by Dan R Jost, Regional Fisheries Manager, Region II, Mobridge

FIVE YEAR FISHERIES MANAGEMENT PLAN

Water: McGee Lake (20-2)

County: Corson

Present Plan: F-21-R-37

Date: January 2005 to December 2009

Previous Plan: F-21-R-32

Date: January 2000 to December 2004

Surface Area: 36.5 acres

Management Class: WWP

Maximum Depth: 20 feet

Mean Depth: 10 feet

INVENTORY

McGee Lake is a 36.5-acre impoundment located on Iron Dog Creek 5.5 miles east and 1 mile south of McIntosh in north central Corson County. The earthen dam and trickle tube overflow that created the lake was constructed by the Works Progress Administration (WPA) in 1934. The origin of McGee Lake's name is unknown. The dam was constructed within a section of land owned by South Dakota School and Public Lands. The State of South Dakota remains the present owner of the lake and surrounding land. The South Dakota Dept. of Game, Fish and Parks applied for, and received, vested water rights for 90 acre/feet of water annually for public recreation on August 15, 1960. Water rights permit number 495-1 is recorded with the Water Resources Commission, Pierre, SD. Fisheries management at McGee Lake is conducted by the South Dakota Dept. of Game Fish & Parks.

The watershed for McGee Lake is 4,200 acres or about 6.5 square miles. The watershed consists of approximately 80% native grasses utilized as pastureland. The remaining 20% is cultivated cropland, farmyards and residences. Topography varies from moderately undulating to gentle slopes with soils of clay-gumbo. From the outlet of McGee Lake water flows down Iron Dog Creek to the Grand River and eventually to Lake Oahe on the Missouri River. The immediate shoreline is pasture consisting of clay gumbo covered by short native grasses. Siltation from the watershed is evident in the upper ½ of the lake. Emergent and submergent vegetation surrounds the entire lake with the exception of the dam grade. During summer months submergent vegetation grows to a depth of 4 feet. Access to McGee is poor with a ½ mile dirt trail leading from a county road to the lake. During wet or snow covered conditions, the trail is impassable. A concrete plank boat ramp in poor condition is the only user facility at McGee.

McGee Lake has provided a recreational resource for the people of Corson County since the time of its construction in 1934. The first recorded fisheries management activity took place in 1936 when 528 adult black crappies were stocked into the lake. No other

stockings are recorded until 1966. Very little information is available concerning McGee prior to 1970. An early lake survey in 1954 is referred to in literature, but information from this survey is not located on file. Various information in the lake file indicate good black crappie and yellow perch fishing in the 1960's until the lake suffered a partial winterkill in 1970. Following the winterkill, northern pike and walleye were stocked into McGee Lake.

The first fisheries population survey on record was conducted at McGee Lake in 1972. Very few fish were captured in the frame nets with northern pike being the most abundant. Black bullhead, black crappie and yellow perch were also captured, but at a rate of less than one fish per net. By 1976 all fish species had increased in numbers, most notably bullheads which comprised 97% of the catch with a CPUE of 355. Bullhead removal by commercial or Department means was recommended. Though providing angling opportunity for crappie and northern, McGee's fish population remained dominated by black bullheads throughout the 1980s. A lake survey in 1990 revealed that bullheads were still the most abundant species, but the CPUE had fallen to 14 per frame net. Black Crappies and northern pike were the only other species captured, indicating a possible fish kill in the late 1980s. Largemouth bass fingerlings were stocked on several occasions in the early 1990s in an attempt to establish bass as the primary predator.

A fisheries population survey on McGee Lake in 1996 showed that bullheads had once again become highly overpopulated. Black crappies continued to provide fishing opportunity having good growth and consistent recruitment despite the bullhead problem. Largemouth bass adults, juveniles and fingerlings were stocked in 1996, 1997 and 1998. Black bullheads were physically netted and removed in 1999. By 2001 bullheads had decreased in density and increased in quality. Electrofishing showed largemouth bass numbers had also increased to a healthy CPUE of 61.5 fish per hour in 2001.

Stocking Record for McGee Lake, Corson County

YEAR	NUMBER	SPECIES	SIZE
1990	2,000	LMB	FGL
1991	3,000	LMB	FGL
1993	2,000	LMB	FGL
1994	1,850	NOP	FGL
1995	3,600	NOP	FGL
1996	175	LMB	ADT
1997	3,500	LMB	FGL
1997	120	NOP	ADT
1998	70	LMB	ADT
2001	3,500	LMB	FGL
2002	4,530	LMB	FGL

McGee Lake was most recently surveyed during June of 2004 utilizing ten, 24-hour, $\frac{3}{4}$ inch frame net sets. Four species of fish including black bullhead, northern pike, black

crappie and yellow perch were sampled. Forty minutes of nighttime electrofishing was also completed at McGee Lake during October of 2004 to sample the largemouth bass population.

Total catch from four, ten-minute runs of fall nighttime electrofishing on McGee Lake, Corson County, October 7, 2004

Species	#	%	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Largemouth Bass	20	100	30	± 20.8	61.5	73	73	108

* One year mean (2001)

Total catch of ten, overnight ¾-inch frame nets at McGee Lake, Corson County, June 14-16, 2004

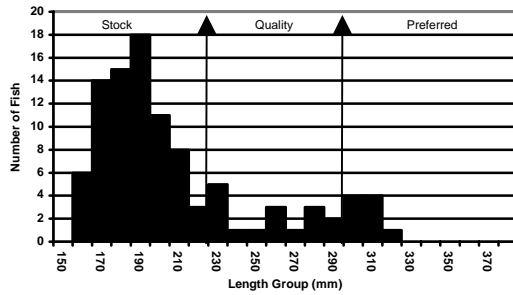
Species	#	%	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Black Bullhead	1,430	99.3	143.0	± 75.9	298.4	25	9	89
Black Crappie	6	0.4	0.6	± 0.4	24.9	100	100	93
Northern Pike	3	0.2	0.3	± 0.2	2.8	--	--	87
Yellow Perch	1	0.1	0.1	± 0.1	2.3	--	--	56

* Ten year mean (1972, 1977, 1981, 1984, 1988, 1990, 1993, 1996, 1998, 2001)

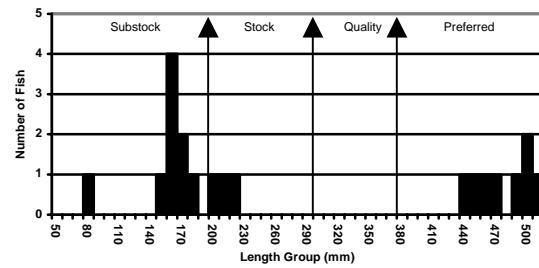
Stocking efforts in the late 1990s were successful in establishing largemouth bass as the dominant predator in McGee Lake. The 2004 electrofishing CPUE of 30 fish per hour was a decrease from 61.5 recorded in 2001. It appears that reproduction is occurring, but young bass are failing to recruit to stock length. PSD and RSD-P were both 73 during the 2004 survey with several ages of fish missing from the population. A fairly large number of bass from the 2001 and 2002 year classes were sampled during the 2004 survey. These fish were just under stock length. It is hoped that they will recruit into the adult population within the next year. Largemouth bass had a relative condition of 104 with growth slightly below the statewide average.

Black bullheads remain the dominant species in McGee Lake. The frame net CPUE of 143 in 2004 is an increase from 112.5 recorded in 2001, but below the 298.4 ten-year mean. With the increase in density, size structure has decreased from the 2001 survey. The current PSD is 25 with an RSD-P of 9 compared to the PSD of 88 in 2001. This is probably due in part to the decreased density in the bass population since the last survey.

Black Bullhead, McGee Lake, 2004



Largemouth Bass, McGee Lake, 2004



Northern pike and yellow perch were the only other fish species sampled during the 2004 survey. Both species were below their ten-year mean with less than one fish per net being captured.

MANAGEMENT GOAL

To manage the fishery at McGee Lake to maximize angling opportunity.

OBJECTIVES AND STRATEGIES

Objective 1. Increase largemouth bass populations to a CPUE of 40 fish per hour of electrofishing and a PSD of between 40 and 60.

Strategy 1a. Stock adult and juvenile largemouth bass to increase density.

Strategy 1b. Monitor largemouth bass population to determine density, growth and population structure.

Objective 2. Decrease black bullhead densities to a trap net CPUE of less than 50 with a PSD greater than 80.

Strategy 2a. Utilize Department crews to remove black bullhead.

Strategy 2b. Increase largemouth bass densities to a level that significantly limits black bullhead recruitment.

Objective 3. Increase black crappie populations at a CPUE of at least 15 and a PSD of 40 to 60.

Strategy 3a. Stock black crappie adults to increase density.

Strategy 3b. Monitor black crappie populations to determine density and size structure.

Objective 4. Inform, receive, and use input from the public and other agencies to assist in the management of McGee Lake.

5 YEAR OPERATIONAL PLAN

1. Conduct a fisheries population survey in 2007 utilizing ten, $\frac{3}{4}$ inch frame net sets and one hour of electrofishing to monitor all fish species.

2. Stock adult largemouth bass adults at a rate of 10/acre in 2005 to supplement existing population and increase density and recruitment.

2. Remove black bullheads at a rate of at least 50 pounds per acre during the 2007 lake survey.

4. The Conservation Officer and other GF&P staff should solicit input from local citizens and sportsmen's groups and provide input back to the Regional Fisheries Manager on a timely basis.

5. Conduct a thorough evaluation of the present management plan and complete a new plan by January 2010.

FIVE YEAR FISHERIES MANAGEMENT PLAN

Water: Trail City

County: Corson

Present Plan: F-21-R-37

Date: January 2005 to December 2009

Previous Plan: F-21-R-32

Date: January 2000 to December 2004

Surface Area: 80 acres

Management Class: WWSP

Maximum Depth: 16 feet

Mean Depth: 5 feet

INVENTORY

Trail City Dam is an 80-acre impoundment located on the upper end of Snake Creek one mile west and ½ mile north of the town of Trail City in southeastern Corson County. Trail City is the common and accepted name, however there is conflicting information on the date and origin of the dam and lake. The South Dakota Place Names, Part II, Lake Names mentions that the lake was named after the town of Trail City and constructed by the Works Progress Administration (WPA) under project #1701 around 1935. Other sources list the dam as being built by the railroad in about 1920. Ownership of the lake is 100% private. The South Dakota Department of Game, Fish and Parks applied water rights permit 500-1 on August 16, 1960 and was granted water right to 234 acre-feet for public recreation on August 16, 1961. Fisheries management at Trail City Dam is completed by the South Dakota Dept. of Game, Fish & Parks.

The watershed for Trail City Dam is 4,480 acres or approximately 7 square miles. Land use in the watershed is 80% pasture, hay and grassland with remaining 20% made up with cultivated agricultural land. The immediate shoreline is bordered by native grasses and is often overgrazed. Siltation from the watershed is evident in the upper portions of the lake. Submergent and emergent vegetation surrounds the entire lake edge. During summer months submergent vegetation grows to a depth of 7 feet. Access to Trail City Dam is good with a county road crossing the dam grade. Due to the amount of vegetation and lack of access trails, shorefishing opportunity is limited. The boat ramp is steep and difficult to use during periods of low water. There are no other public use facilities available. From the outlet of Trail City Dam water flows down Snake Creek, to the Grand River and into Lake Oahe on the Missouri River.

The first recorded fisheries management activity at Trail City Dam was the stocking of largemouth bass in 1929. Between 1930 and 1950 bullheads, largemouth bass, and black crappies were stocked. In 1954 the first lake survey was conducted. Black bullheads and yellow perch were the only two fish species present. Largemouth bass were once again stocked and northern pike were introduced at Trail City following the survey. During surveys in 1971 and 1975, bullheads and northern pike were the only species sampled. A

fish kill during the winter of 1978 eliminated all game fish present in Trail City Dam and the lake was restocked with black crappie, channel catfish, northern pike, and yellow perch on several occasions during the late 1970s. A lake survey in 1982 yielded low densities of crappie, northern pike, channel catfish and yellow perch. By 1986 black bullheads had reestablished their population and became the dominant species. Lake surveys from 1989 to 1997 results showed high densities of black bullheads and low density, poor quality populations of other species.

Trail City Dam suffered from a major fish kill during the winter of 1997. Above average runoff during the spring of 1997 refilled the lake and restocking efforts took place the following summer. In 1997, northern pike adults, northern pike fry, yellow perch adults, black crappie adults, and largemouth bass fingerlings were stocked in Trail City Dam. In 1999 black bullheads were still the most abundant species, but northern pike, yellow perch and black crappies had reestablished populations. The lake again suffered from a significant fish loss due to winterkill in 2003 and water levels have been too low to restock since that time.

**Stocking record for Trail City Dam, Corson County
following 1997 winterkill**

YEAR	NUMBER	SPECIES	SIZE
1997	97	NOP	ADT
1997	40,000	NOP	FRY
1997	1,600	YEP	ADT
1997	213	BLC	ADT
1997	8,000	LMB	FGL

Trail City Dam was most recently surveyed prior to the 2003 winter kill during May of 2002. Two, 150 experimental gill-net set and ten, ¾ inch frame-net sets were utilized to sample the fish population. A total of five species of fish were sampled with black bullhead being the most abundant. Yellow perch showed moderate density and had increased their size structure since 1999 with a gill-net PSD of 36. Northern pike CPUE was 4.9 in the trap-nets. Northern Pike PSD was 100 with an RSD-P of 28. Black crappie densities had increased to a CPUE of 7.4 and size structure was excellent with a PSD of 78 and an RSD-P of 42. One bluegill was also sampled during the survey.

**Total catch of two, 150 ft. experimental gill nets at Trail City Dam, Corson County
May 28-30, 2002**

Species	#	%	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Black Bullhead	192	90.1	96.0	± 64.6	14.5	25	0	91
Yellow Perch	12	5.6	6.0	± 3.1	21.0	36	0	88
Northern Pike	9	4.2	4.5	± 10.8	7.0	100	44	86

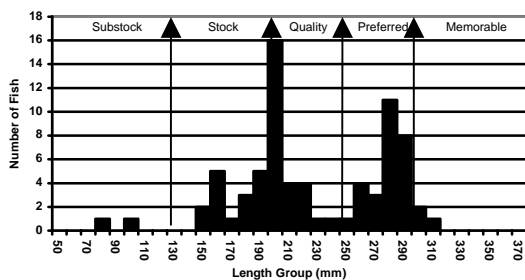
* Two years (1997 & 1999, a severe winterkill in 1997, but was restocked before the survey)

**Total catch of ten, overnight ¾-inch frame nets at Trail City Dam, Corson County
May 28-30, 2002**

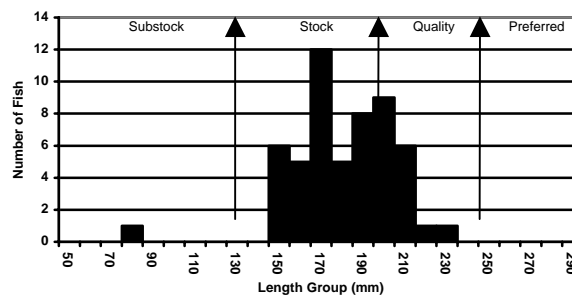
Species	#	%	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Black Bullhead	1053	86.4	105.3	± 47.0	162.4	24	1	--
Black Crappie	74	6.1	7.4	± 5.0	0.3	78	42	95
Northern Pike	49	4.0	4.9	± 1.6	3.5	100	28	83
Yellow Perch	42	3.4	4.2	± 1.9	2.4	31	0	85
Bluegill	1	0.1	0.1	± 0.1	0.0	--	--	98

* Two years (1997 & 1999, a severe winterkill in 1997, but was restocked before the survey)

Black Crappie, Trail City Dam, 2002



Yellow Perch, Trail City Dam, 2002



MANAGEMENT GOAL

To manage the fishery at Trail City Dam to maximize angling opportunity.

OBJECTIVES AND STRATEGIES

Objective 1. Sample all fish species present when lake refills to determine fish survival following low water levels of 2003 – 2004.

Strategy 1a. Monitor fish populations with standard lake survey to determine density and structure.

Objective 2. Maintain northern pike densities with a trap-net CPUE of 5 or greater.

Strategy 2a. Monitor population utilizing standard lake survey to determine density and size structure.

Strategy 2b. Stock northern pike fingerlings to increase population densities.

Objective 3. Decrease black bullhead densities to a trap-net CPUE of 50 and increase PSD to greater than 60.

Strategy 3a. Maintain northern pike densities at a level that limits black bullhead recruitment.

Strategy 3b. Utilize Dept. crews to remove all bullheads captured during standard lake surveys.

Objective 4. Maintain yellow perch at a CPUE of 10 to 20 per gill-net and a PSD between 40 and 60 with growth and condition at or above the state average.

Strategy 4a. Monitor population utilizing standard lake surveys to determine density and size structure.

Strategy 4b. Stock yellow perch adults to supplement population if gill-net CPUE is less than 10.

Objective 5. Inform, receive, and use continuing input from the public and other agencies to assist in the management of Trail City Dam.

5 YEAR OPERATIONAL PLAN

1. Conduct a fisheries population survey in 2005 utilizing two, 150-foot, experimental gill-net and ten, 24 hour, ¾ inch frame-net sets.
2. If survey results indicate a northern pike CPUE of less than 5, stock with northern pike fingerlings at a rate of 100 per acre in 2006.
3. If survey result indicate a yellow perch CPUE of less than 10, stock with yellow perch adults at a rate of 10 per acre in 2006.
4. Monitor dissolved oxygen levels through winter months to predict possible fish kills and, if fish kill potential becomes evident, prepare stocking plan for northern pike fingerlings and yellow perch adults.
3. Remove all black bullheads captured during the 2005 lake survey.
4. The local Conservation Officer and other GF&P staff should solicit input from local citizens and sportsmen's groups and provide input back to Regional Fisheries Manager on a timely basis.
5. Conduct a thorough evaluation of the present management plan and complete new plan by January 2010.

Completed by Dan R Jost, Regional Fisheries Manager, Region II

FIVE YEAR FISHERIES MANAGEMENT PLAN

Water: Burke Lake (30-02)

County: Gregory

Present Plan: F-21-R-37

Date: January 2005 to December 2009

Previous Plan: F-21-R-32

Date: January 2000 to December 2004

Surface Area: 27 acres

Management Class: WWSP

Maximum Depth: 16 feet

Mean Depth: 9 feet

INVENTORY

Burke Lake is a 27-acre impoundment located on the upper end of Coon Creek two miles east of the City of Burke in central Gregory County. The construction of the earthen dam that created the lake was completed by the Works Progress Administration (WPA) in 1936. Burke Lake was named due to its proximity to the City of Burke. A State Recreation Area owned and managed by the South Dakota Dept. of Game, Fish and Parks, Division of Parks and Recreation surrounds the majority of the lake. The remaining shoreline, on the west edge of the lake, is privately owned. Original easements for the construction of Burke Lake are not available in the fisheries lake file, and it is thought the dam grade and lake have been located on land owned by the State since the time of construction. The South Dakota Dept. of Game, Fish and Parks, Division of Wildlife completes fisheries management activities at Burke Lake.

The watershed for Burke Lake is relatively small at 1,280 acres or approximately two square miles. Ninety percent of the land in the watershed consists of native grasses used as livestock pasture. The remaining 10% is made up of cultivated cropland. Topography of the watershed ranges from steep slopes to primarily flat and slightly rolling prairie. The immediate shoreline is $\frac{3}{4}$ State Recreation Area with the remainder bordered by a farmyard and livestock wintering area that has resulted in large amounts of nutrients entering the lake over the past sixty years. High nutrient levels have lead to heavy algae blooms during the summer months. From the concrete spillway outlet at Burke Lake, water flows down Coon Creek to South Whetstone Creek to Lake Francis Case on the Missouri River. Emergent vegetation is present along the west $\frac{1}{4}$ of the lake. Submergent vegetation is scarce and is mainly confined to the upper ends of the creek arms. Access to Burke Lake is good with the Parks and Recreation Division maintaining

roads and the boat ramp at the lake. Picnic and camping areas, vault toilets and a fishing pier are also available at Burke Lake Recreation Area.

From the time of its construction Burke Lake has been an important outdoor recreational area for the Burke community and Gregory County. The Lake and State Recreation Area have continuously provided opportunities for angling, boating, picnicking, and camping. The first fisheries management activities at Burke were the stocking of black bullheads, black crappies, and largemouth bass in the early 1930s. Early reports indicated that bass and bullheads supported the fishery in the late 1930s and remained the most sought after species until around 1950. The first recorded fisheries population survey was conducted in the summer of 1953. Common carp and small black crappies made up the majority of the fish present. The lake was chemically eradicated in 1954 and restocked with rainbow trout. With summertime water temperatures well above trout's thermal tolerance, a coldwater fishery was never established and fishing opportunity was poor at Burke Lake until a severe winterkill eliminate nearly all fish life in 1969.

Following the winterkill in 1969, largemouth bass was the only species, on record, being stocked in Burke Lake. A remnant population of bluegill and black bullheads survived the winterkill and quickly overpopulated. Yellow perch and northern pike were also recorded as being present during the 1970s. These species either entered through the watershed or were "unofficially stocked" by local citizens. Based on all reports available, Burke Lake remained to have only fair to poor angling success and fishing pressure was minimal until another winterkill occurred in 1978. The lake was restocked with black crappie, bluegill, yellow perch and largemouth bass during the summer of 1978. A fish population survey in 1985 showed bluegill as the most abundant species followed by black bullhead, northern pike, yellow perch and black crappie. Size structure for all fish species was small. By 1989 crappie had replaced bluegill as the most abundant species but size structure remained less than that desired by anglers. It was felt that low oxygen levels resulting in frequent, partial, winterkills limited largemouth bass survivability keeping predator densities too low to control panfish recruitment. A dredging project which removed several thousand cubic yards of silt from Burke Lake was completed in 1994. The dredging project increased total lake volume and decreased the likelihood of winterkills.

The trend of highly abundant panfish with small size structure and a low density largemouth bass population remained to be the case until 2000. Though largemouth bass fingerling stockings had been completed on several occasions during the 1990s, increased bass densities were not being achieved. The new management plan called for the stocking of adult and juvenile largemouth at a rate of 10 fish per acre during three consecutive years. The plan also included the implementation of a fifteen-inch minimum size limit to protect small bass from angler harvest. The objective was to increase largemouth bass density. The increased bass density would in-turn limit panfish recruitment resulting in faster panfish growth and increase size structure. The overall goal was to increase angler use and satisfaction of Burke Lake by providing a quality panfish opportunity.

Stocking record for Burke Lake, Gregory County 1990 to Present

YEAR	SPECIES	NUMBER	SIZE
1991	LMB	1,350	FGL
1992	LMB	1,350	FGL
1994	LMB	1,350	FGL
1996	LMB	2,700	FGL
1997	LMB	2,700	FGL
1998	LMB	2,700	FGL
1999	NOP	2,700	FGL
1999	YEP	500	ADT
2000	YEP	1,862	JUN
2001	LMB	210	ADT
2001	LMB	2,700	FGL
2002	LMB	36	ADT
2002	LMB	2,700	FGL
2002	LMB	34	JUN
2003	LMB	2,790	FGL
2003	LMB	7,230	FGL
2004	LMB	100	ADT

Burke Lake's fish population was most recently surveyed utilizing ten, 24 hour, $\frac{3}{4}$ inch frame-net sets in July and forty minutes of nighttime electrofishing during September of 2002. A total of seven species of fish were sampled including; black crappie, bluegill, yellow perch, largemouth bass, northern pike, black bullhead and green sunfish.

Total catch of ten, overnight $\frac{3}{4}$ -inch frame nets at Burke Lake, Gregory County, July 8-10, 2002.

Species	#	%	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Black Crappie	438	60.0	43.8	± 9.0	35.5	47	0	107
Bluegill	185	25.3	18.5	± 7.8	35.6	86	8	105
Yellow Perch	66	9.0	6.6	± 2.9	0.9	54	2	94
Northern Pike	19	2.6	1.9	± 0.6	1.8	25	13	84
Black Bullhead	17	2.3	1.7	± 0.6	15.6	--	--	91
Largemouth Bass	3	0.4	0.3	± 0.2	0.01	--	--	92
Green Sunfish	2	0.3	0.2	± 0.3	0.4	--	--	91

* Seven year mean (1979, 1982, 1985, 1989, 1993, 1996, 1999)

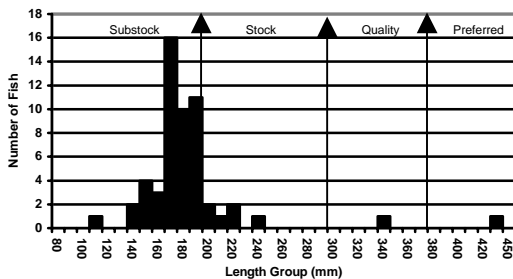
**Total catch of four, ten-minute runs of fall nighttime electrofishing on Burke Lake,
Gregory County, September 9, 2002.**

Species	#	%	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Largemouth Bass	55	100	82.5	± 27.0	--	25	13	104

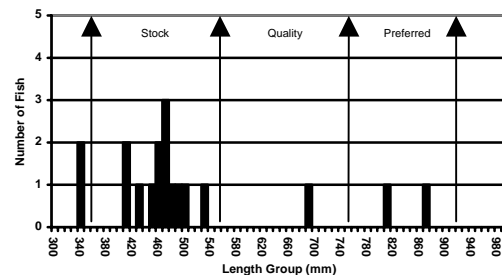
* First time electrofishing

Nighttime electrofishing was completed on Burke Lake for the first time on record during the 2002 survey. Recent adult and juvenile stockings of largemouth bass appear to have successfully increased bass density. Density was good with a CPUE of 82.5. Many age one bass were sampled. PSD for largemouth was 25 and RSD-P was 13. Growth was slow, but this may reflect the fact that many of these bass were transferred to Burke Lake from private waters with stunted populations. Northern pike represent the other predator species sampled at Burke. The pike population remains stable with a CPUE of 1.9, a PSD of 25, and an RSD-P of 13.

Largemouth Bass, Burke Lake 2002

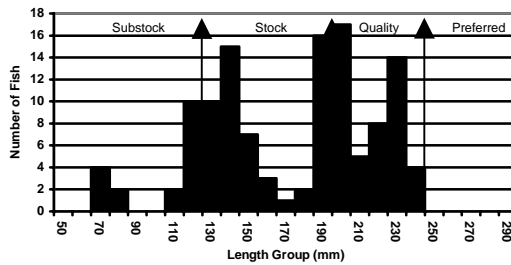


Northern Pike, Burke Lake 2002

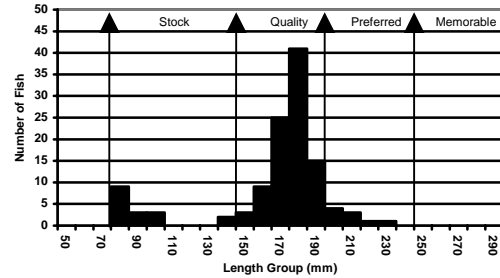


Black crappie remains the most abundant species found in Burke Lake. During the 2002 survey a CPUE of 43.8 was recorded. This is considerably less than that of previous surveys. With the decrease in density, crappies have shown a dramatic increase in size structure with a PSD of 47 in 2002 compared to 0 in a survey three years prior. Bluegills have shown an even more dramatic decrease in population density with a decline from 167.6 in 1999 to 18.5 during the 2002 survey. PSD has increased to 86 with an RSD-P of 8. Growth was good with means near the state average for both bluegill and crappie. It appears that the increased bass density has vastly improved the panfish size structure.

Black Crappie, Burke Lake 2002



Bluegill, Burke Lake 2002



The yellow perch population is starting to also benefit from the large bass population in Burke Lake. The CPUE has increased to an all time high of 6.6. This is well above the 2.0 in the 1999 survey as well as the seven-year mean of 0.9. Growth has also seen the benefits. Growth of the older fish was below average and has now increased to above average. The young fish also have seen the benefits to have growth above the statewide, regional, and SLI means. Their condition has also improved greatly from a Wr of 74 in 1999 to 94. Black bullhead and green sunfish were also captured in the 2002 survey.

MANAGEMENT GOAL

To manage the fishery at Burke Lake to maximize angling opportunity.

OBJECTIVES AND STRATEGIES

- Objective 1.** Maintain largemouth bass population with a CPUE of 40 per hour of nighttime electrofishing and a PSD of 30 to 60.
- Strategy 1a. Continue to stock adult and juvenile largemouth bass to maintain densities as needed.
- Strategy 1b. Maintain the 15-inch minimum size limit on largemouth bass to protect small bass from angling mortality.
- Strategy 1c. Monitor largemouth bass population to determine density and population structure.
- Objective 2.** Maintain bluegill and crappie densities to a CPUE of less than of 50 each and with growth to the state average.
- Strategy 2a. Maintain largemouth bass density at a level that limits panfish recruitment lowering density and increasing growth rates.
- Strategy 2b. Monitor panfish populations to determine density and population structure.
- Objective 3.** Inform, receive, and use continuing input from the public and other agencies to assist in the management of Burke Lake.
-

5 YEAR OPERATIONAL PLAN

1. Conduct a standard fisheries population survey in 2005 and 2008 utilizing eight, 24 hour, $\frac{3}{4}$ inch fame-net sets and one hour of nighttime electrofishing to monitor all fish species.
 2. Stock adult largemouth bass at a rate of 10/acre in 2006 if CPUE is less than 30 during the 2005 survey.
 3. The local Conservation Officer and other GF&P staff should solicit input from public sources and provide input back to the ARS-Fisheries on a timely basis.
 4. Conduct a thorough evaluation of the present management plan and complete a new plan by January 2005.
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FIVE YEAR FISHERIES MANAGEMENT PLAN

Water: Fairfax Lake

County: Gregory

Present Plan: F-21-R-37

Date: January 2005 to December 2009

Previous Plan: F-21-R-32

Date: January 2000 to December 2004

Surface Area: 21 acres

Management Class: WWSP

Maximum Depth: 22 feet

Mean Depth: 12 feet

INVENTORY

Fairfax Lake is a 21-acre impoundment located on South Scalp Creek two miles north and one mile east of the town of Fairfax in southeastern Gregory County. The lake was constructed in 1934 by the Works Progress Administration (WPA) and named for its proximity to the town. Originally easements had been completed for the public use of the lake and surrounding area but were never officially filed. During the early 1940s an access dispute occurred between the public and an adjoining landowner denying public access to Fairfax Lake. The matter was officially resolved in April of 1947 when the State of South Dakota took the matter to court. As a result of a jury verdict, the court ordered that for the sum of \$1,480.50 the State of South Dakota take 42.3 acres including and adjacent to Fairfax Lake for fish and wildlife management and public recreation. The South Dakota Dept. of Game, Fish and Parks was granted easement to the property as recorded in Misc. Book 20, page 633 of the Gregory County Register of Deeds Office. Water rights were granted to the Dept. of GF&P in 1961 that allow for 120 acre-feet of water to be used annually for public recreation under permit #621-2.

The watershed of Fairfax Lake is 100% privately owned and consists of 73% agricultural cropland, 25% pasture and hayland, and 2% trees, residences and roads. Native grasses and stands of hardwood trees border the immediate shoreline. The topography of the watershed varies from nearly level uplands to moderate slopes characterized by excessive runoff and erosion. Soil types include moderately deep loams of the Tuthill Association on the uplands and moderately deep loams and heavy clays of the Boyd Association along the main area of the drainage. Emergent vegetation is located along the shoreline on the upper portions of the lake. Submergent vegetation is present around the entire shoreline to a depth of 5 feet and becomes dense during summer months. Access to Fairfax Lake is via a trail that surrounds the entire lake. Though in fair condition, the road becomes impassable during wet or snow covered conditions. The concrete plank boatramp is in fair condition. The spillway at Fairfax has suffered considerable erosion

in the approach and downstream areas; this has allowed water to begin to flow under the structure compromising its integrity.

Fairfax Lake has provided a recreational fishery since the time of its origin. Prior to construction of the Fort Randall Dam creating Lake Francis Case, Fairfax was considered the most utilized lake in Gregory County. The first recorded fisheries management activity took place in 1934 with the stocking of black bullhead fingerlings. Largemouth bass and black bullheads were stocked on several occasions from 1936 to 1950. Fishing during this period was reported as excellent by the chief fisheries biologist with largemouth bass, bluegill and bullheads all providing well above average angling opportunity. Walleyes were stocked in Fairfax in 1954 but a walleye fishery never developed. No other fish stockings are recorded until northern pike were introduced in 1982. Lake surveys conducted in 1964 and 1974 showed good catches of bluegill and yellow perch. By 1980, average size of bluegill and perch had decreased and densities were becoming higher than desired. During the 1996 lake survey black crappies were recorded for the first time as the most abundant species captured. The introduction of crappies along with bluegill and perch added to the problem of overpopulation and increased largemouth bass densities were needed to control recruitment and increase growth of panfish. Bluegill and black crappie have dominated the fisheries community in Fairfax Lake over the past ten years. Densities of these species remain high while size structure is small and growth is below the state average. Supplemental stockings of largemouth bass have been completed on several occasions in an attempt to strengthen the predator population and reduce panfish densities.

Stocking record for Fairfax Lake, Gregory County (1982 – 2004)

YEAR	NUMBER	SPECIES	SIZE
1982	13,500	NOP	FGL
1983	7,000	CCF	FGL
1988	3,500	LMB	FGL
1989	3,500	NOP	FGL
1990	3,500	LMB	FGL
1997	2,100	LMB	FGL
1998	2,100	LMB	FGL
1999	210	LMB	ADT
1999	2,100	LMB	FGL
2000	216	LMB	ADT
2001	2,100	LMB	FGL
2004	100	LMB	JUN

Fairfax Lake was most recently surveyed during July, 2002 using six, 24hour, ¾ inch frame net sets. Five species of fish were sampled with black bullheads being the most abundant for the first time on record. Population density exploded from a CPUE of 1.5 in 1999 to 242.3 during the 2004 survey. For the high density population, size structure for bullheads looked good with a PSD of 80 and an RSD-P of 58. The yellow perch

population also showed a significant increase from the 1999 survey with a recorded high frame net CPUE of 21.2. PSD was 54 and RSD-P was 6. Growth for perch was equal to the state average. As quickly as black crappies appeared in 1996, their population all but disappeared in 2002. Bluegill numbers were lower than 1999 but near the six-survey mean of 26.8. Since no electrofishing has been completed at Fairfax Lake during the past several years, very little is know about the current largemouth bass population.

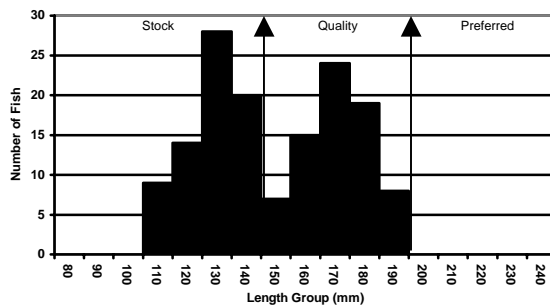
**Total catch of six, overnight ¾-inch frame nets at Fairfax Lake,
Gregory County, 2002**

Species	#	%	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Black Bullhead	1454	83.8	242.3	± 83.8	1.5	80	58	85
Bluegill	144	8.3	24.0	± 8.6	26.8	51	0	93
Yellow Perch	127	7.3	21.2	± 5.9	4.2	54	6	75
Black Crappie**	9	0.5	1.5	± 1.4	124.0	75	0	103
Northern Pike	1	0.1	0.2	± 0.2	0.6	--	--	89

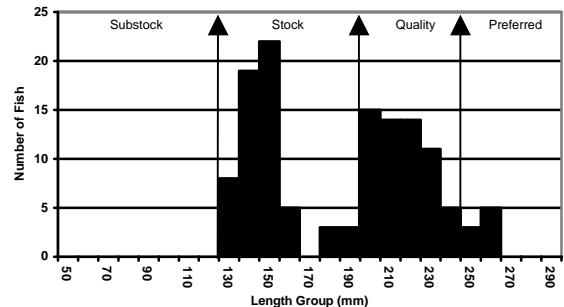
* Six years (1980, 1983, 1986, 1989, 1996, & 1999)

** Two years for CPUE (1996 & 1999)

Bluegill, Fairfax Lake, 2002



Yellow Perch, Fairfax Lake, 2002



Trap net CPUE for all species sampled in Fairfax Lake from 1980 to the present

Species	1980	1983	1986	1989	1996	1999	2002
Black Bullhead	3.4	2.0	0.4	1.3	1.3	0.7	242.3
Black Crappie	--	--	--	--	130.1	117.9	1.5
Yellow Perch	12.1	6.0	1.1	2.8	2.0	1.4	21.2
Largemouth Bass	0.3	--	0.3	0.1	0.3	0.1	--
Northern Pike	--	1.0	1.5	--	0.3	0.7	0.2
Bluegill	7.0	24.0	17.4	29.4	17.4	65.4	24.0

MANAGEMENT GOAL

To manage the fishery at Fairfax Lake to maximize angling opportunity.

OBJECTIVES AND STRATEGIES

Objective 1. Maintain largemouth bass densities with a nighttime electrofishing CPUE of stock length and greater fish of 30/hour or greater with a PSD range of 40 to 70, and RSD-P between 10 and 40, and with growth at or near the statewide average.

Strategy 1a. Collect adequate data to determine current largemouth bass population density, condition, and size structure.

Strategy 1b. If required stock largemouth bass adults to supplement existing population and increase recruitment.

Objective 2. Maintain bluegill and yellow perch population with a CPUE of greater than 10 and less than 40, a PSD of 20 to 60 and an RSD-P of 5 to 20.

Strategy 2a. Monitor panfish populations utilizing standard sampling techniques.

Strategy 2b. Maintain adequate density of largemouth bass to limit panfish recruitment and minimize potential for slower than average growth.

Objective 3. Reduce black bullhead populations to a trap-net CPUE of less than 50.

Strategy 3a. Increase and maintain largemouth bass densities at a high enough level to significantly limit black bullhead recruitment.

Strategy 3b. Utilize Dept. crews to physically remove bullheads from Fairfax Lake.

Objective 4. Inform, receive, and use continuing input from the public and other agencies to assist in the management of Fairfax Lake.

5 YEAR OPERATIONAL PLAN

1. Conduct a standard fisheries population survey in 2005 and 2008 utilizing eight, 24 hour, ¾ inch frame net sets, two, 150-foot experimental gill net sets, and one hour of nighttime electrofishing to monitor all fish species.
2. Stock largemouth bass adults at a rate of 10/acre if survey results yield a CPUE of less than 20 in 2005.
3. The local Conservation Officer and other GF&P staff should solicit input from all public sources and provide input back to the Regional Fisheries Manager on a timely basis.
4. Conduct a thorough evaluation of the present management plan and complete a new plan by January 2010.

Completed by Dan R Jost, Regional Fisheries Manager, Region II

FIVE YEAR FISHERIES MANAGEMENT PLAN

Water: Byre (45-02)

County: Lyman

Present Plan: F-21-R-37

Date: January 2005 to December 2009

Previous Plan: F-21-R-32

Date: January 2000 to December 2004

Surface Area: 125 acres

Management Class: WWP

Maximum Depth: 17 feet

Mean Depth: 7.1 feet

INVENTORY

Byre Lake is a 125-acre impoundment located on a tributary of Medicine Creek 2.5 miles north and 1.5 miles east of Kennebec in central Lyman County. The construction of an earthen dam by the Federal Emergency Relief Administration created the lake in 1937. The lake was named after O.J. Byre, a local resident that donated the land on which the dam and lake were constructed. In 1939, for the sum of one dollar, Ole J. Byre signed an easement with the South Dakota Game and Fish Commission to flood 99.89 acres of land and provide a twelve-foot strip of land above the high water contour for public use. Harold Boise signed a similar easement for the remainder of the flooded property, but in an agreement between the State and Boise in 1940, this easement was dissolved. The easement between the State and Byre is recorded at the Lyman County Register of Deeds office in Miscellaneous Book 11, pages 464 and 465. The South Dakota Department of Game, Fish and Parks has water rights, permit #542-2, for 270 acre/feet of water annually for public recreation. The Wildlife Division of the South Dakota Dept. of Game, Fish and Parks completes fisheries management activities at Byre Lake.

The watershed for Byre Lake is recorded at 7,680 acres or approximately 12 square miles. The entirety is privately owned and land use in the watershed is approximately 60% cultivated agricultural land, mainly row crops, and 40% pasture and native grasses, much of which is in the Conservation Reserve Program. Native grasses and a county road border the immediate shoreline. The topography varies from level to gently rolling with soils moderately to well drained deep clays. From the concrete spillway at Byre Lake water flow to Medicine Creek and eventually to Lake Sharpe on the Missouri River. Submergent vegetation surrounds the entire shoreline with the exception of the dam grade, and grows to a depth of four feet. During summer months dense stands of vegetation cover the upper 1/3 of the lake and limit access to shore anglers. Very little emergent vegetation is located at Byre Lake. Access to the lake is good with a gravel road, maintained by the county, along the north shoreline. The concrete plank boat ramp and parking area at Byre Lake are in good condition.

Byre Lake has provided recreational angling opportunity from the time of its construction. Records indicate that the lake was an excellent fishery for largemouth bass in the 1940s and 1950s. The first recorded fisheries management activities at Lake Byre were the stockings of black bullheads in 1946 and 1952. During the summer of 1959, the City of Kennebec requested permission to chemically eradicate Byre Lake due to high density roughfish and stunted panfish populations. A fish population survey conducted in August of 1959 sampled large numbers of black crappie, bluegill, black bullhead and common carp. An agreement was signed between Kennebec and GF&P where the Dept. would provide necessary chemicals and give technical advice and the City would complete the labor to eradicate Byre Lake. Heavy rains and runoff during the eradication period hampered efforts and the project was reported to be only partially successful.

Following the 1959 chemical rehabilitation, Byre Lake was stocked with northern pike, bluegill, channel catfish, and largemouth bass in 1960 and 61. During the late 1960s and 1970s Byre Lake provided good fishing opportunity and was utilized by anglers for northern pike, largemouth bass, bluegill and yellow perch. Carp and bullheads were still present in the lake, but there densities remained low and they did not hinder the fishery. Fish population surveys in 1882 and 1984 indicated that the black bullhead population was once again reaching nuisance levels. Extremely high density bullhead population were adversely effecting gamefish and fishing opportunity declined along with angling pressure.

A construction project to repair the dam and spillway at Byre Lake created the need for the lake to be drawn down to facilitate the needed repairs. The lake was once again chemically eradicated in the fall of 1985 during the lowered water levels. Rainbow trout and fathead minnows were restocked in 1986. During a major runoff event in the spring of 1987 the spillway failed and the dam was breached. The reconstruction of the dam and spillway was undertaken. After completion Byre Lake refilled in 1991. Rainbow trout were again stocked in 1991 and 1992 to provide immediate angling opportunity but long-term intentions were not to manage Byre Lake as a cold water fishery. Largemouth bass and walleye fingerlings were introduced following the rehabilitation to establish a predator base to control bullhead populations that reentered the lake from the watershed. Yellow perch were stocked in 1995 to provide panfish opportunity along with the bluegill that had reestablished in Byre. Despite predator stocking efforts, bullheads were the most abundant species sampled during fish population surveys in the 1990s. Walleye large fingerling stockings were scheduled on a biannual basis to attempt to control bullhead recruitment. Walleye stockings were moderately successful controlling bullhead recruitment and density. During the 2000 survey bullhead CPUE was under 200 and all fish captured were above stock length.

Stocking record for Byre Lake, Lyman County.

YEAR	NUMBER	SPECIES	SIZE
1991	7,000	FHM	ADT
1991	24,000	LMB	FGL
1991	10,375	RBT	FGL
1991	13,800	WAE	FGL
1992	75,000	RBT	FGL
1992	4,660	WAE	FGL
1993	1,400	WAE	FGL
1994	3,125	WAE	FGL
1995	370	YEP	ADT
2001	3,450	WAE	FGL
2003	2,427	WAE	FGL

Byre Lake's fish population was most recently sampled during July 7-9, 2003 utilizing ten, 24-hour frame net sets and two, experimental gill net sets. On October 14, 2003 Byre Lake was electrofished after dark for 60 minutes (six, ten-minute transects). A total of five fish species were sampled including black bullhead, walleye, bluegill, northern pike and largemouth bass.

**Total catch of two, 150 ft. experimental gill nets at Byre Lake, Lyman County,
July 7-9, 2003**

Species	#	%	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Black Bullhead	207	96.3	103.5	± 115.4	0.0	77	23	77
Walleye	8	3.7	4	± 9.2	11.0	100	63	83

* One year mean (1994)

**Total catch of ten, overnight ¾-inch frame nets at Byre Lake, Lyman County,
July 7-9, 2003**

Species	#	%	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Black Bullhead	8,901	99.5	890.1	± 175.6	89.7	52	8	81
Bluegill	23	0.3	2.3	± 1.2	2.6	100	65	93
Walleye	8	0.08	0.8	± 0.5	5.0	100	88	88
Northern Pike	11	0.1	1.1	± 0.5	0.5	91	45	79
Largemouth Bass	2	0.02	0.2	± 0.2	0.8	100	100	111

* Four year mean (1993, 1994, 1997, 2000)

**Total catch from six ten-minute runs of fall nighttime electrofishing on Byre Lake,
Lyman County, October 14, 2003**

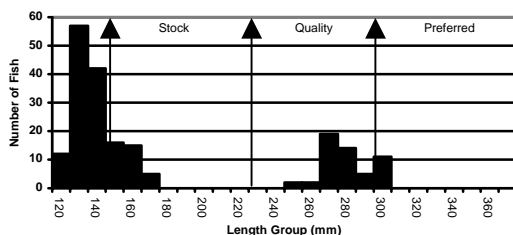
Species	#	%	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Largemouth Bass	15	29.4	15.0	± 10.9	20.5	100	100	118
Walleye	36	70.6	36.0	± 15.2	23.5	44	22	95

* Two year mean (1993, 2000)

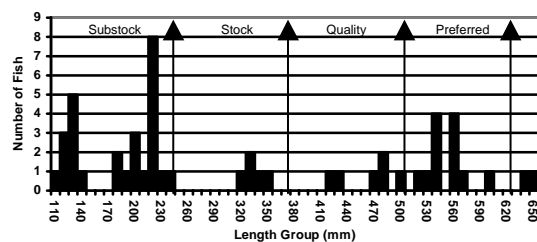
Black bullheads have once again overtaken Byre Lake. Bullhead frame net CPUE was 890.1 during the 2003 survey. This is a dramatic increase over the 127.5 recorded in a fish population survey in 2000. Biannual stockings of large walleye fingerlings were scheduled for 1997 and 1999 but not completed due to a statewide lack of walleye production. It appears that by missing these two scheduled walleye stockings, the bullheads were able to reproduce and recruit into the population without being limited by predation. Condition was poor with a Wr of 81 and PSD was 52 with an RSD-P of 8. From the length frequency of the bullheads, it appears that recruitment was minimal for several years until recently when large year classes were produced. These year classes of bullheads were at or below stock length in 2003.

Since the scheduled stockings for walleye were not completed in the late 1990s, density has decreased and the average size of over stock length fish has increased. The 2002 gill net CPUE was 8 with a PSD of 100 and an RSD-P of 63. Wr was 89 and growth was slightly slower than the state average. During fall electrofishing, several walleyes were sampled below stock length, most likely the result of 2003 large fingerling stockings. Information gained from age and growth analysis indicates that walleyes do have limited natural reproduction and recruitment into the adult population at Byre Lake.

Black Bullhead, Byre Lake, 2003

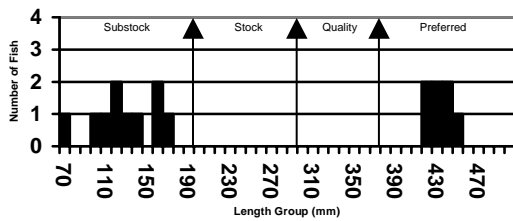


Walleye, Byre Lake, 2003

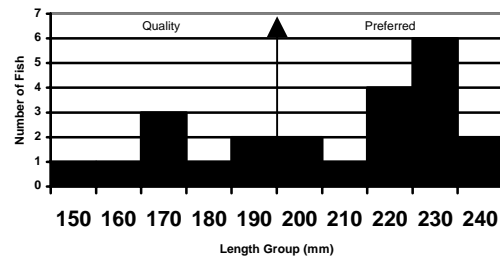


The largemouth bass population in Byre Lake has declined over recent years with only five fish sampled over stock length in 2003. The condition of the bass sampled was excellent with a Wr of 110, however growth was below the state average. A higher density largemouth population would be beneficial by taking some of the pressure off walleye for controlling the black bullhead population. The bluegills in Byre Lake are low density, but a high quality fishery. In 2003 the CPUE was only 2.3 which is right at the four-survey mean of 2.6. Size structure was good with all fish of quality or preferred sizes. Growth was above the state average and condition was good with a Wr of 93.

Largemouth Bass, Byre Lake, 2003



Bluegill, Byre Lake, 2003



MANAGEMENT GOAL

To manage the fishery at Byre Lake to maximize angling opportunity.

OBJECTIVES AND STRATEGIES

- Objective 1.** Increase largemouth bass population to a nighttime electrofishing CPUE of 20/hour and a PSD of 40 or greater establishing them as the primary predator.
- Strategy 1a. Stock largemouth bass adults as necessary to increase population densities.
- Strategy 2a. Monitor largemouth bass population by means of standard survey methods to determine density, age, growth, size structure, and condition.
- Objective 2.** Utilize walleye as a secondary predator and to provide to limit bullhead recruitment and increase angling opportunity.
- Strategy 2a. Stock large walleye fingerlings to maintain population levels adequate to limit black bullhead recruitment and to provide moderate angling opportunity.
- Strategy 2b. Monitor walleye population to determine density and stocking success.
- Objective 3.** Decrease black bullhead densities to a CPUE of 100 or less.
- Strategy 3a. Maintain largemouth bass and walleye populations at a level that effectively limits bullhead recruitment.
- Strategy 3b. Utilize Department crews to remove all black bullheads captured during standard fish population surveys.
- Objective 4.** Introduce a black crappie population with a frame net CPUE of 15 to 30 a PSD of 30 to 50 and growth at or above the state average.
- Strategy 4a. Stock black crappie adults to introduce the species.
- Objective 5.** Inform, receive, and use continuing input from the public and other agencies to assist in the management of Byre Lake.
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5 YEAR OPERATIONAL PLAN

1. Conduct a standard fisheries population surveys in 2005 and 2008 utilizing eight 24 hour , $\frac{3}{4}$ inch framenets, two, 150 foot experimental gillnet sets, and at least one hour of nighttime electrofishing to monitor all fish species.
2. In survey result in 2005 show a electrofishing CPUE of less than 20/hour, stock with bass adults at a rate of 10/surface acre.
3. Stock large walleye fingerlings at a rate of 25/acre in 2005 and 2007.
4. If survey results indicate a bluegill CPUE of 10 or less in 2005, stock with black crappie adults at rate of 10/acre to introduce the panfish species.
5. The local Conservation Officer and other GF&P staff should solicit input from the public sources and provide input back to the ARS-Fisheries on a timely basis.
6. Conduct a thorough evaluation of the present management plan and complete a new plan by January, 2005.

Completed by Dan R Jost, Regional Fisheries Manger, Region II

FIVE YEAR FISHERIES MANAGEMENT PLAN

Water: Hurley

County: Potter

Present Plan: F-21-R-37

Date: January 2005 to December 2009

Previous Plan: F-21-R-32

Date: January 2000 to December 2004

Surface Area: 79 acres

Management Class: WWP

Maximum Depth: 29 feet

Mean Depth: 12 feet

INVENTORY

Lake Hurley is a 79-acre impoundment located on lower portion of Cheyenne Creek five miles west, six miles north, and four miles west of Gettysburg, or two and one half miles north and four miles east of Whitlock's Bay in west central Potter County. The earthen dam that created the lake was constructed by the Works Progress Administration (WPA) in 1938. Lake Hurley was named after Dr. S.E. Hurley, a long time resident of the Gettysburg area. The lake is 100% privately owned. To allow for the construction of the dam and for public access to a 12-foot strip of land above the high water mark, two easements to the State of South Dakota were signed in 1937. These easements are recorded in Misc. Book 9, pages 601 and 602 in the Potter County Register of Deeds office. The South Dakota Department of Game, Fish and Parks applied for and received vested water rights to 675 acre/feet of water at Lake Hurley on April 21, 1959 as recorded by permit number 573-3 of the Water Resources Commission, Pierre, SD. The Wildlife Division of the Department of Game, Fish & Parks completes fisheries management activities at Lake Hurley.

The watershed for Lake Hurley is 28,800 acres or approximately 45 square miles, which is made up entirely of privately owned agricultural land. Land use percentages in the watershed are approximately 40% cropland consisting of small grains and row crops, 58% pastureland or Conservation Reserve acres, 1% feedlots and livestock wintering area, and 1% trees, shelter belts, and farmsteads. Topography in the watershed varies from undulating to moderately rolling with soils of the Samsil-Opal association which are clay with shale occurring at twenty to forty inches from the surface. From the outlet of Lake Hurley water flows down Cheyenne Creek to Whitlocks Bay on Lake Oahe, part of the Missouri River. The immediate shoreline is native grasses utilized as pasture with hardwood trees and shrubs found along the water edge and in the main creek drainage. Emergent vegetation, consisting of cattail and bulrush, is found along the entire shoreline excluding the dam grade and an area along the south side of the lake where a high cut bank is located. Submergent vegetation is found along the lake edge and grows to a

depth of five feet. Access is good via a gravel road leading from a county road to the north end of the lake. The boat ramp at Lake Hurley is in good condition but needs annual repair due to damage done during ice cover. Shore angling opportunity is limited due to vegetation and access to the shoreline. A vault toilet is the only other public use facility available at Lake Hurley.

Lake Hurley has provided recreational angling opportunity since the time of its construction. Prior to the construction of the Oahe Dam and Lake Oahe, Hurley was considered the most important water in Potter County. The first recorded fisheries management activities with took place in the 1930s with the stocking of black bullheads, largemouth bass and black crappies. These three species supported the fishery until 1952 when the dam grade washed out and was rebuilt. Northern pike, channel catfish and largemouth bass were stocked following the dam repair.

The first recorded lake survey at Lake Hurley was completed in 1961 with the use of five overnight frame nets. Crappies, bluegills and bullheads, in order of abundance, comprised 98% of the total catch with yellow perch, northern pike, walleye and largemouth bass also being sampled. A 1968 lake survey showed a shift in the population structure with black bullheads comprising 79% of the total catch. Commercial fishing of bullheads in 1969 and 70 removed 75.8 pounds of fish per surface acre, but black bullheads continued to dominate the fish community at Lake Hurley. With the increase in abundance of black bullheads, other fish species began to decline and fishing quality and pressure soon decreased.

In 1981 the Dept. of Game, Fish and Parks began stocking walleye fingerlings in Lake Hurley to try and provide a secondary predator along with largemouth bass to help reduce the bullhead problem and improve angling quality for game fish. The stockings were successful and by 1988 walleyes were present in the lake survey. Though bullhead abundance was still higher than desired, other species, such as bluegill and black crappie, densities and size structure were improving. Fishing quality continued to improve as the bullhead numbers declined and in 1996 black bullheads were no longer the most common fish sampled during lake surveys. In lake surveys in 1999 and 2002, no black bullheads were sampled at Lake Hurley. Large walleye fingerling stockings have continued since 1981 and are scheduled on a biannual basis.

Stocking record for Lake Hurley, Potter County1, 1981 - 1994

YEAR	NUMBER	SPECIES	SIZE
1981	5,000	WAE	FGL
1982	10,000	WAE	FRY
1983	4,000	WAE	FGL
1989	3,325	WAE	FGL
1992	1,087	WAE	FGL
1993	2,500	WAE	FGL
1994	1,975	WAE	FGL
1997	1,975	WAE	FGL
1999	1,975	WAE	FGL
2004	1,891	WAE	FGL

Lake Hurley's fish population was most recently surveyed in July of 2002 with ten, 24 hour, frame net sets, and one, 150-foot experimental gill net set. Nighttime electrofishing was attempted on October 28th, but unsuccessful due to cold water temperatures. Six species of fish were sampled including black crappie, bluegill, yellow perch, largemouth bass, northern pike and walleye.

Black crappie was the most abundant species captured in the frame nets with a CPUE of 28.7. Size structure remained good with a PSD of 42 and an RSD-P of 15. Bluegill densities continued on a declining trend with frame net CPUE dropping to 5.6. Size structure remains good with a PSD of 87 and an RSD-P of 32. Bluegill growth is slightly above the state average. Yellow perch, the third panfish present in Lake Hurley, continue to have a high population density with a gill net CPUE of 70. With the high density, size structure is small with a PSD of only 2. The perch population does not appear to be stunted with growth equivalent to the state average.

Largemouth bass were not effectively sampled due to cold water temperatures at the time of electrofishing, however seventeen bass were captured in the frame nets which is a high number for that type of sampling equipment. Of the fish sampled the PSD was 100 and RSD-P was 94. Only one bass less than 4 years old was captured, but this may be a factor of the sampling method since bass recruitment has never been a problem at Lake Hurley. Walleyes continue to have a low density population at Hurley with a gill net CPUE of 3. Size structure is small with growth above the state average and condition poor with a W_r of 78. All walleyes sampled were from the 1999 and 1997 fingerling stockings. With three panfish species and Lake Hurley's history of a black bullhead problem, it may be important to maintain walleyes as a secondary predator. Northern pike also serve as a predatory fish species in Lake Hurley. Their population is self-sustaining, but they are not sampled effectively since netting takes place during warm water temperatures during the summer months.

**Total catch of one, 150 ft. experimental gill net at Lake Hurley, Potter County,
July 16, 2002**

Species	#	%	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean W_r
Yellow Perch	70	83.3	70	± 0.0	31.5	2	0	88
Northern Pike	7	8.3	7	± 0.0	3.3	100	57	82
Walleye	3	3.6	3	± 0.0	2.0	67	0	78
Bluegill	3	3.6	3	± 0.0	0.0	33	0	104
Black Crappie	1	1.2	1	± 0.0	1.7	--	--	100

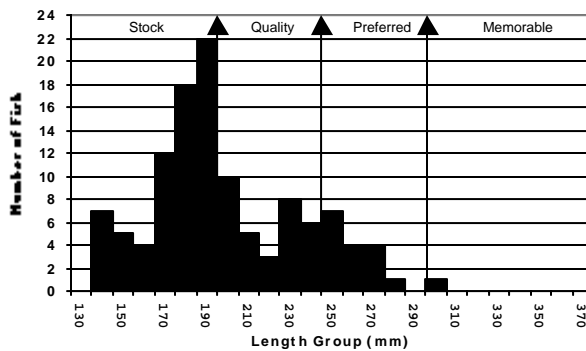
* Six years (1980, 1982, 1985, 1993, 1996, and 1999)

**Total catch of ten, overnight ¾-inch frame nets at Lake Hurley, Potter County,
July 15-17, 2002**

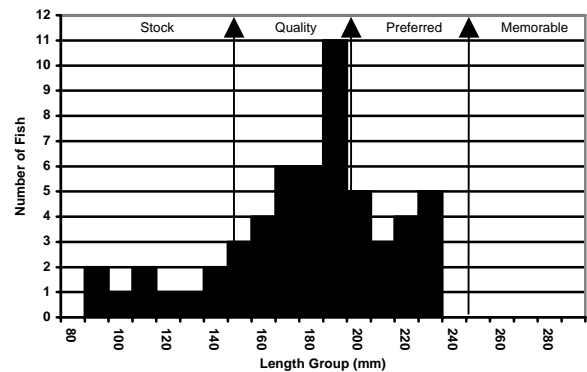
Species	#	%	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Black Crappie	287	71.4	28.7	± 13.0	14.9	42	15	84
Bluegill	56	13.9	5.6	± 1.3	13.9	87	32	100
Yellow Perch	23	5.7	2.3	± 1.0	2.4	5	0	91
Largemouth Bass	17	4.2	1.7	± 0.6	0.3	100	94	98
Northern Pike	13	3.2	1.3	± 0.3	1.3	--	--	80
Walleye	6	1.5	0.6	± 0.4	0.4	--	--	72

* Seven years (1980, 1982, 1985, 1988, 1993, 1996, and 1999)

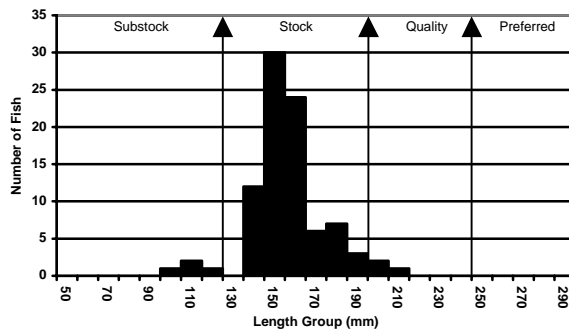
Black Crappie, Lake Hurley, 2002



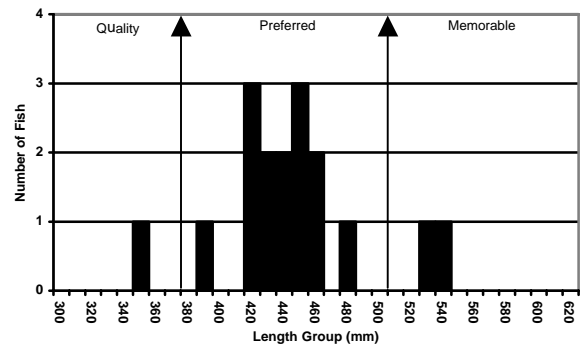
Bluegill, Lake Hurley, 2002



Yellow Perch, Lake Hurley, 2002



Largemouth Bass, Lake Hurley, 2002



**Gill net (GN), trap net (TN), and electrofishing (EF) CPUE for all fish species
sampled from Lake Hurley since 1980**

Species	1980	1982	1985	1988	1993	1996	1999	2002
Black Bullhead (GN)	21.0	6.0	53.0	--	--	--	--	--
Black Bullhead (TN)	190.6	131.3	289.9	188.5	15.6	9.5	--	--
Black Crappie (GN)	2.0	--	1.0	--	1.0	--	6.0	1.0
Black Crappie (TN)	16.1	34.4	4.3	--	4.6	2.5	42.1	28.7
White Crappie (GN)	--	--	--	--	--	--	--	--
White Crappie (TN)	--	--	--	46.6	--	--	--	--
Yellow Perch (GN)	77.0	--	3.0	--	11.0	37.0	61.0	70.0
Yellow Perch (TN)	5.0	--	2.0	2.8	1.3	5.0	0.9	2.3
Largemouth Bass (EF)	--	--	--	8.0	9.8	--	20.7	--
Largemouth Bass (GN)	--	--	--	--	--	--	--	--
Largemouth Bass (TN)	--	--	0.2	0.5	1.0	0.4	0.1	1.7
Northern Pike (GN)	7.0	--	1.0	--	1.0	2.0	9.0	7.0
Northern Pike (TN)	1.0	0.4	0.1	1.9	1.6	2.3	2.0	1.3
White Sucker (GN)	1.0	--	--	--	--	--	--	--
White Sucker (TN)	--	--	--	0.4	--	--	--	--
Walleye (EF)	--	--	--	2.0	--	--	--	--
Walleye (GN)	--	--	2.0	--	--	4.0	6.0	3.0
Walleye (TN)	0.3	0.3	0.2	1.0	0.5	0.4	--	0.6
Bluegill (GN)	--	--	--	--	--	--	--	3.0
Bluegill (TN)	3.1	0.8	8.1	56.7	9.8	12.0	7.1	5.6

MANAGEMENT GOAL

To manage the fishery at Lake Hurley to maximize angling opportunity.

OBJECTIVES AND STRATEGIES

Objective 1. Maintain largemouth bass population with a minimum nighttime electrofishing CPUE for stock length and greater fish of 20\hour, a PSD between 40 and 70, RSD-P between 10 and 40, and growth at or above the state average.

Strategy 1a. Monitor largemouth bass population by means of standard survey methods to determine density, age, growth, size structure, and condition.

Objective 2. Utilize walleye as a secondary predator to limit panfish recruitment and to provide increased angling opportunity.

Strategy 2a. Stock large walleye fingerlings to maintain population levels adequate to limit panfish recruitment and to provide moderate angling opportunity.

Strategy 2b. Monitor walleye population to determine density and stocking success.

Objective 3. Maintain panfish (bluegill, black crappie and yellow perch) frame net CPUE of at least 10 and less than 75 for each species with PSD values between 20 and 60 and RSD-P values between 10 and 40 for at least two of the panfish species.

Strategy 3a. Maintain largemouth bass and walleye populations at densities high enough to limit panfish recruitment and prevent overpopulation and slow growth rates.

Strategy 3b. Monitor panfish population by means of standard survey methods to determine density, age, growth, size structure, and condition.

Objective 4. Inform, receive, and use continuing input from the public and other agencies to assist in the management of Lake Hurley.

5 YEAR OPERATIONAL PLAN

1. Conduct a standard fisheries population survey in 2005 and 2008 utilizing ten, 24 hour, ¾ inch frame net sets, two, 150 foot experimental gill net sets, and at least 1 hour of nighttime electrofishing to monitor all fish species.
2. Stock large walleye fingerlings at a rate of 25/acre in 2006 and 2008.
3. The local Conservation Officer and other GF&P staff should solicit input from private and public sources and provide input back to the Regional Fisheries Manager on a timely basis.
4. Conduct a thorough evaluation of the present management plan and complete a new plan by January, 2010.

Completed by Dan R Jost, Regional Fisheries Manager, Region II

FIVE YEAR FISHERIES MANAGEMENT PLAN

Water: Rahn Lake (60-11)

County: Tripp

Present Plan: F-21-R-37

Date: January 2005 to December 2009

Previous Plan: F-21-R-32

Date: January 2000 to December 2004

Surface Area: 26 acres

Management Class: WWP

Maximum Depth: 16 feet

Mean Depth: 6.3 feet

INVENTORY

Rahn Lake is a 26-acre impoundment located on an unnamed tributary of the Keyopaha River 19 miles south and 1.5 east of Winner in southern Tripp County. The earthen dam and concrete spillway that created the lake were constructed by the Works Progress Administration (WPA) in 1941. Rahn Lake was named after W.H. Rahn, the owner of the land on which the dam grade was constructed. To allow for the construction of the dam and resulting flooded property, two easements were granted to the State of South Dakota in 1934 for public use of the lake and a strip of land twelve feet above the high water contour. These easements are recorded in Miscellaneous Book 11, pages 534 and 535 in the Tripp County Register of Deeds office. In 1940, another easement to the State for an additional 15.15 acres to allow improved public access was granted (Misc. Book 13, page 100). The State of South Dakota, Game and Fish Commission also purchased 120 acres including the majority of the lake and land, including the dam grade, on the west side of the lake in 1940. This Deed is recorded in Deed Record Book 36 in the Tripp County Register of Deeds office, Winner, SD. The Wildlife Division of the South Dakota Dept. of Game, Fish & Parks completes fisheries management activities at Rahn Lake.

The watershed for Rahn Lake is 19,840 acres or about 31 square miles, which primarily consists of privately owned agricultural land. Land use in the watershed is approximately 30% cultivated cropland, 50% pasture and hayland, and 20% trees, residences and roads. Topography varies from nearly flat to gently rolling. From the spillway at Rahn Lake, water flows south to the Keyopaha River, to the Niobrara River, and eventually the Missouri River. Native grasses and stands of hardwood trees border the immediate shoreline. Emergent vegetation is located along the shoreline on the upper portions of the lake. Submergent vegetation is present around the entire shoreline to a depth of 5 feet and becomes very dense during summer months. Access to Rahn Lake is via a trail on the west edge of the lake. The concrete plank boat ramp is in fair condition.

Rahn Lake has provided recreational fishing opportunity since its creation in 1941. The first recorded fisheries management activity at Rahn was the stocking of 2,000 largemouth bass fingerlings in 1943. Black bullheads were introduced to the lake in 1945 and 1946. These two species supported the fishery through the 1940s into the 1950s. Black crappies were introduced in 1946, and by the time of the first recorded fish population survey in 1959, they were the most abundant species sampled at Rahn Lake. Other species sampled in the 1959 survey were black bullhead, bluegill, channel catfish, yellow perch and northern pike. By 1961 bluegills had become the most abundant species present. Bluegills and crappies continued to dominate the fisheries community at Rahn and by the mid-1960s high density populations had stunted growth and made the panfish undesirable to anglers. Rahn Lake was chemically eradicated in 1967.

Following the chemical eradication in 1967, a post-treatment survey showed that only a remnant population of black bullheads remained in the Rahn Lake. Rainbow trout were stocked in 1968 and 1969 to provide a short-term fishery. Channel catfish were introduced to Rahn in 1971. Although there is no record of stocking, bluegills were once again present in the lake by 1973. Heavy snow cover over an extended period of time resulted in a partial fish kill during the winter of 1978. A survey was conducted the following summer to evaluate the fish population. Bluegills had once again become the most abundant species in Rahn Lake. Their size structure was small, but this may have been due to the larger fish being effected by the low oxygen levels of the previous winter. Green sunfish, black bullheads and largemouth bass were also sampled in the 1978 survey. The lake was resurveyed in 1982 and only eight fish were captured in ten frame nets and one gill net. Obviously, an unrecorded fish kill had taken place the preceding winter.

With Rahn Lake being nearly void of fish in 1982, channel catfish and northern pike were restocked. By 1984 bullheads were the most abundant species present at Rahn followed by bluegill, northern pike, golden shiner, and green sunfish. Largemouth bass were reintroduced in 1986. By 1990 black bullheads and bluegills were at very high densities and growth was slow providing little desirable fishing opportunity. It was determined that largemouth bass densities had to be increased to limit bullhead and bluegill recruitment, reducing density and improving growth and size structure. Largemouth bass adults were stocked from 1991 to 1993.

Stocking record for Rahn Lake, Tripp County, 1989 – 2005

YEAR	NUMBER	SPECIES	SIZE
1989	1,500	SMB	FGL
1989	150	YEP	ADT
1989	1,100	YEP	FGL
1990	1,050	YEP	ADT
1990	1,500	SMB	FGL
1991	1,500	SMB	FGL
1992	1,500	SMB	FGL
1992	175	LMB	ADT
1993	30	LMB	ADT
2001	2,600	LMB	FGL

Rahn Lake was sampled on June 10-12, 2002, with ten overnight frame net sets. The frame nets have 3 ft. x 5 ft. frames, 60 ft. leads, and ¾ in. knotted mesh. No experimental gill nets were set during this survey. On September 10, 2002, Rahn Lake was electrofished for 40 minutes (4-ten minute transects) with pulse AC to sample the largemouth bass population. Seven fish species were sampled during the 2002 survey including black crappie, black bullhead, bluegill, northern pike, green sunfish, yellow perch and largemouth bass.

**Total catch of ten, overnight ¾-inch frame nets at Rahn Lake, Tripp County,
June 10-12, 2002**

Species	#	%	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Black Crappie	419	64.7	41.9	± 12.8	4.0	42	0	90
Black Bullhead	115	17.7	11.5	± 6.7	69.0	98	0	84
Bluegill	89	13.7	8.9	± 3.3	29.5	79	0	98
Northern Pike	14	2.2	1.4	± 0.4	4.1	100	7	81
Green Sunfish	8	1.2	0.8	± 0.5	0.9	--	--	116
Yellow Perch	3	0.5	0.3	± 0.2	2.4	--	--	94

* Four year mean catch (1990, 1992, 1996, and 1999; partial winterkill with low catches in 1986)

Total catch from four, ten-minute runs of fall nighttime electrofishing on Rahn Lake, Tripp County, September 10, 2002

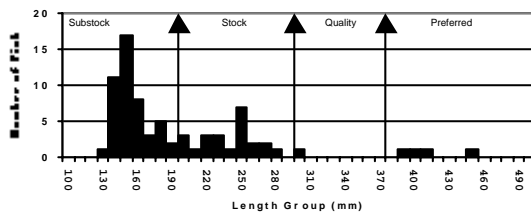
Species	#	%	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Largemouth Bass	75	100	112.5	± 24.5	0.0	18	14	110

* No history in the last four surveys of electrofishing

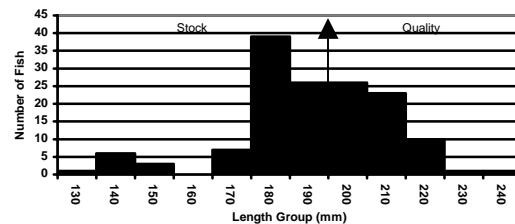
It appears that stocking efforts in the early 1990s have created a self sustaining largemouth bass population and were successful in establishing bass as the dominant predator in Rahn Lake. During 2002 nighttime electrofishing a CPUE of 112.3 fish per hour was recorded. It appears that reproduction is occurring, and many of the bass sampled were below stock length. PSD was 18 and RSD-P was 14 indicating that size structure was less than desired. It is hoped that the bass under stock length will recruit into the adult population within the next year or two. Largemouth bass had a relative condition of 110, however growth well below the statewide average.

Black crappie emerged as the dominant species in Rahn Lake in 2002. The frame net CPUE of 41.9 is an increase from 11.3 recorded in 1999, and well above the four-year mean of 4.0. With the increase in density, size structure has not decreased. The current PSD is 42 with an RSD-P of 0. This lack of larger fish is understandable since growth begins to slow as the fish get older. Black crappie condition is average with a Wr of 90. Since growth is slowing as the fish age, crappie density may be too high resulting in stunting. This is a distinct possibility in small waters with large species diversity such as Rahn Lake.

**Largemouth Bass, Rahn Lake,
2002**



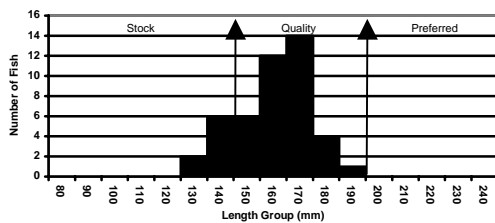
**Black Crappie, Rahn Lake,
2002**



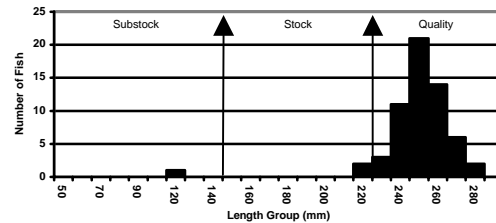
The bluegill CPUE has decreased this survey to 8.9, which is down from the 18.0 in 1999 and the four-year mean of 29.5. Growth for bluegills is well below the statewide, regional and SLI means. Their condition is good with a Wr value of 98. The size structure along with the slow growth indicates that this population is stunted. The PSD of 78 has increased over the past three surveys, but no fish are moving up out of the quality size range. The younger fish in the population are growing to quality size then slowing down.

The overall black bullhead populations it improving. The CPUE of 11.5 is down from the 58.1 in 1999 and the four-year mean of 69.0. To go along with the decrease in density, the size structure is increasing with a PSD of 98, which is up from 0 in 1996 and 2 in 1999. Their condition is fine with a Wr value of 84. This trend should continue due to the lack of any young bullheads in the length frequency.

Bluegill, Rahn Lake, 2002



Northern Pike, Rahn Lake, 2002



Northern pike were also sampled in the survey. They appear to have a fair population of larger fish with a PSD of 100 and an RSD-P of 7, although their CPUE has declined over the past few surveys. This presence will help the largemouth bass as the predator to control the panfish populations in Rahn Lake.

Green sunfish and yellow perch were sampled in this survey. Both species have seen decreases in their CPUE's from the past few surveys.

Trap net CPUE for all fish species sampled in Rahn Lake since 1986

Species	1990	1992	1996	1999	2002
Black Bullhead	82.4	42.1	93.5	58.1	11.5
Black Crappie	--	0.7	4.1	11.3	41.9
Yellow Perch	4.5	2.7	1.6	0.8	0.3
Largemouth Bass	0.4	--	--	0.1	--
Northern Pike	7.3	0.1	7.6	1.4	1.4
Bluegill	71.9	11.1	17.1	18.0	8.9
Green Sunfish	--	0.2	2.3	1.1	0.8
Golden Shiner	0.1	--	0.1	--	--

MANAGEMENT GOAL

To manage the fishery at Rahn Lake to maximize angling opportunity.

OBJECTIVES AND STRATEGIES

Objective 1. Maintain largemouth bass densities with a nighttime electrofishing CPUE of at least 50/hour and increase PSD to be between 30 and 60.

Strategy 1a. Monitor largemouth bass population using standard survey methods to determine density and size structure.

Strategy 1b. If required stock largemouth bass adults to supplement existing population.

Objective 2. Decrease bluegill and crappie densities and improve populations to the state average for growth and relative weight.

Strategy 2a. Monitor panfish populations utilizing standard survey methods to determine density, size structure and growth.

Strategy 2b. Maintain adequate density of predator species to limit panfish recruitment and minimize potential for stunting.

Strategy 2c. Utilize as a source of panfish to stock other waters.

Objective 3. Maintain black bullhead populations at a frame-net CPUE of less than 20.

Strategy 3a. Maintain largemouth bass densities at a high enough rate to limit black bullhead recruitment.

Objective 4. Inform, receive, and use input from the public and other Agencies to assist in the management of Rahn Lake.

5 YEAR OPERATIONAL PLAN

1. Conduct a standard fisheries population survey in 2005 and 2008 utilizing ten, 24 hour, ¾ inch frame-net sets and at least one hour of nighttime electrofishing to monitor all fish species.

2. Utilize bluegill and black crappie populations as a source to stock other waters when needed.

3. The local Conservation Officer and other GF&P staff should solicit input from public sources and provide input back to the Regional Fisheries Manager on a timely basis.

4. Conduct a thorough evaluation of the present management plan and complete a new plan by January 2010.

Completed by Dan R Jost, Regional Fisheries Manager, Region II

Appendix A. A brief explanation of catch per unit effort (CPUE), proportional stock density (PSD), relative stock density (RSD) and relative weight (Wr).

Catch Per Unit Effort (CPUE) is the catch of fish or animals in numbers or weight taken by a defined period of effort. In fisheries most commonly refers to trap-net nights of effort, gill-net nights of effort, or catch per one hour of electrofishing.

Proportional Stock Density (PSD) is calculated by the following formula:

$$\text{PSD} = \frac{\text{Number of fish} > \text{quality length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

Relative Stock Density (RSD-P) is calculated by the following formula:

$$\text{PSD} = \frac{\text{Number of fish} > \text{preferred length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

PSD and RSD are unitless and usually calculated to the nearest whole digit.

Size categories for selected species found in South Dakota lakes in centimeters

Species	Stock	Quality	Preferred	Memorable	Trophy
Walleye	25	38	51	63	76
Sauger	20	30	38	51	63
Yellow perch	13	20	25	30	38
Black crappie	13	20	25	30	38
White crappie	13	20	25	30	38
Bluegill	8	15	20	25	30
Largemouth bass	20	30	38	51	63
Smallmouth bass	18	28	35	43	51
Northern Pike	35	53	71	86	112
Channel catfish	28	41	61	71	91
Black bullhead	15	23	30	38	46
Common carp	28	41	53	66	84
Bigmouth buffalo	28	41	53	66	84
Smallmouth buffalo	28	41	53	66	84

For most fish, 30-60 or 40-70 are the typical objectives ranges for a “balanced” population. Values less than the objective range indicate a population dominated by small fish while values greater than the objective range indicate a population comprised mainly of large fish.

Relative Weight (Wr) is a condition index that quantifies fish condition (i.e. how much the fish weighs for its length). A Wr range of 90-100 is a typical objective for most fish species. When mean Wr values are well below 100 for a size group problems may exist food supplies and feeding relationships. When mean Wr values are well above 100 for a size group, fish may not be making the best use of available prey.